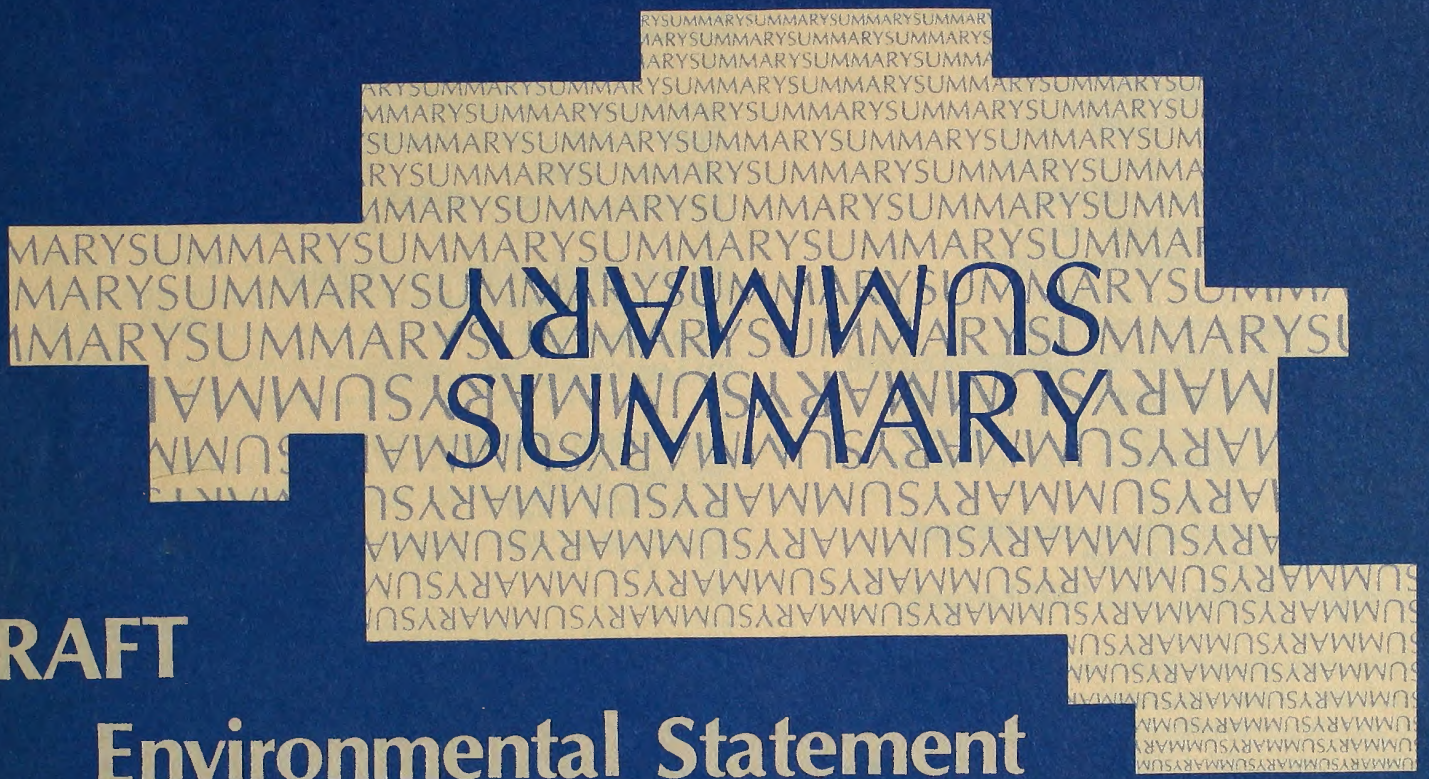

DRAFT
Environmental Statement
Crude Oil Transportation System

PORT ANGELES, WASHINGTON TO CLEARBROOK, MINNESOTA (AS PROPOSED BY NORTHERN TIER PIPELINE COMPANY)

The Draft Environmental Statement is available for public inspection at the following Bureau of Land Management office locations:

Washington Office of Public Affairs
18th and C Streets N.W.
Washington, D.C. 20240

Oregon State Office
729 N.E. Oregon St.
Portland, OR 97208

Spokane District Office
West 920 Riverside
Spokane, WA 99201

Idaho State Office
Room 398 Federal Building
550 W. Fort Street
Box 042
Boise, ID 83724

Coeur d'Alene District Office
1808 N. Third Street
Coeur d'Alene, ID 83814

Montana State Office
222 N. 32nd Street
P.O. Box 30157
Billings, MT 59107

Butte District Office
220 N. Alaska
P.O. Box 308
Butte, MT 59701

Lewistown District Office
Bank Electric Building
Drawer 1160
Lewistown, MT 59457

Miles City District Office
West of Miles City
P.O. Box 940
Miles City, MT 59301

Dickinson District Office
Pulver Hall
P.O. Box 1229
Dickinson, ND 58601

For further information call the Oregon State Office at (503) 231-2001; or from outside Oregon, toll free at 1 (800) 547-5532.

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INTRODUCTION

The Northern Tier Pipeline Company (NTPC) proposes to construct and operate a common carrier crude oil transportation system consisting of a marine terminal at Port Angeles, Washington, an onshore storage facility about 6 miles east of Port Angeles at Green Point, and a 1,557 mile pipeline to Clearbrook, Minnesota. The initial design capacity of the system would be 709,000 barrels per day (bpd) with expansion to 933,000 bpd anticipated within 5 years of the start of operation. Approximately 50 percent of the throughput is expected to be Alaskan North Slope crude oil, with the remainder coming from other domestic and foreign sources.

Since the pipeline would cross federal lands NTPC must obtain a right-of-way permit from the Department of the Interior (DOI). DOI has determined that the proposal is a major action which would significantly affect the human environment, and that an environmental statement will be required prior to making any decision regarding the application for a right-of-way permit. This determination was made in accord with section 102(2)(C) of the National Environmental Policy Act of 1969, as amended (Public Law 91-190). The Bureau of Land Management (BLM) has been designated the agency responsible for preparing the Federal Environmental Statement.

This Summary of the Draft Environmental Statement (DES) has four parts. First, there is a brief discussion of the background of the proposal. This section also presents an overview of agency involvements and of the procedures which will be followed in the continuing process of federal evaluation of the proposal. Second, there is a brief description of the proposal and its objectives. Third, there is a summary of the major findings arrived at during the preparation of the DES. In this part the DES itself is not summarized chapter by chapter. Instead, there is a general summary of the environmental impacts which would probably occur if the proposed action is carried out. The fourth part is an overview of the DES itself, which can be used as a guide to the content of the entire document.

Readers desiring greater detail should refer to the complete DES. The DES can be found at BLM state and district offices and at many state, university, college, and public libraries in those states which would be crossed by the proposed pipeline. BLM office locations are listed on the inside front cover of this report.

Proposed Project Background and Federal Procedures

Historically, a large share of U.S. crude oil imports supplying the Northern Tier states of Washington, Oregon, Idaho, Montana, North Dakota, Minnesota, Michigan, Wisconsin, Illinois, Indiana and Ohio came from Canada. The maximum volume imported from Canada was 1,108,000 bpd in 1973. The imported crude oil entered the United States through pipelines from Canada to Washington, Montana, North Dakota and Minnesota. In 1974, Canada decided to eliminate crude oil exports by the end of 1982, and began a gradual reduction of volumes exported. In September 1978, the National Energy Board of Canada revised its decision and announced the intention to maintain exports to the United States at 55,000 bpd until 1982.

Beginning in 1977, with the completion of the Trans-Alaska Pipeline, crude oil supplies from the Prudhoe Bay area of Alaska have been available on the West Coast. Currently the amount exceeds the capacity of west coast refineries by approximately 500,000 to 600,000 bpd. This amount, which is expected to increase, is currently transported by tanker through the Panama Canal in order to reach Gulf of Mexico and east coast ports.

As a result of the Canadian export curtailment and the availability of Alaskan oil in excess of West Coast needs, a number of studies have investigated crude oil transportation systems and crude oil demand of the refineries in the Northern Tier states. The two most recent and complete studies were carried out by the Pace Company, acting as a consultant to NTPC, and by the U.S. Department of Energy (DOE).

The Pace Company study predicted an inadequacy of pipeline capacity to deliver crude oil to the Northern Tier states of 695,000 bpd in 1990, and 710,000 bpd by 2000, assuming full expansion of existing pipelines. The preliminary findings of the ongoing DOE study indicate unfulfilled refinery demand resulting from transportation restraints of 375,000 bpd in 1990, and 621,200 bpd by 2000. These estimates are based on the assumption of 100 percent utilization of refinery capacity. Assuming utilization of 90 percent of refinery capacity the projection is for a shortfall of 215,400 bpd in 1990, and 214,300 bpd in 2000. The DOE study also estimates unfulfilled consumer demand of 129,300 bpd in 1990, and 320,300 bpd in 2000, as a result of transportation restraints on distribution of refined products in the Northern Tier states.

In response to the perceived need for new sources of crude oil supply to the Northern Tier states, and the excess supply of Alaskan oil on the West Coast, NTPC developed a major crude oil transportation system proposal. In December 1976, representatives of NTPC met with DOI and other federal agencies to describe their proposed crude oil transportation system. DOI was involved because the proposed pipeline would cross federal lands over which the Secretary of the Interior has permitting authority.

In February 1977, NTPC was notified by DOI of the requirements of the Mineral Leasing Act of 1920 (as amended) pertaining to right-of-way permits to cross federal lands and of the minium detail needed in the project proposal. NTPC was advised that the proposal was considered to be a major action requiring an environmental statement (ES) prior to a decision on the application for a right-of-way permit. NTPC was also informed that it would be responsible for prepayment of costs incurred in preparing the ES and in processing the application.

In April 1977, NTPC submitted an application to BLM for an oil pipeline right-of-way permit to cross federal lands. Following consultation with other federal agencies, BLM developed a preparation plan for the ES which was approved in July 1977. NTPC first provided funds to BLM in September 1977; and shortly thereafter BLM began preparing the ES.

In order to expedite the decision-making process on the NTPC application, BLM adopted a schedule for completion of the DES by August 1978, with the final environmental statement (FES) to be submitted to the Environmental Protection Agency (EPA) in December 1978.

On April 20, 1978, NTPC announced a major change in the proposed pipeline route, and amended its application for a right-of-way permit on July 21, 1978. In response to the change, BLM modified its schedule to

provide time to gather and analyze data pertaining to the revised pipeline route.

Under the current schedule, the DES was submitted to EPA on January 3, 1979. Following that date there is a 45-day public comment period. During this time the public may review the DES and submit written comments to BLM and/or testify at public hearings. The public hearings will be held in selected cities along the proposed pipeline route in Washington, Idaho, Montana, North Dakota, and Minnesota. The hearings will take place during the last 2 weeks of February 1979. The public comment period will end on February 26, 1979.

BLM will review and analyze all public comments received in writing and at the hearings. Responses to all comments will be presented in the FES, which is scheduled to be submitted to EPA on May 1, 1979. After a 30-day public review period following publication of the FES the Secretary of the Interior will make a decision on the NTPC application for a right-of-way permit to cross federal lands. The decision will be based in part on the findings presented in the FES and in part on other considerations including the Department of Energy needs analysis.

If the right-of-way application is approved NTPC will be authorized to construct a pipeline across federal lands in accordance with the provisions of the right-of-way permit. In addition to the right-of-way approval from the Department of the Interior, NTPC would need to obtain various permits, licenses, and agreements from other federal, state, and local agencies and easements from private landowners. The additional regulatory approvals concern different aspects of construction, operation and maintenance of the proposed facilities. A summary of the agencies which would be involved and the nature of their interrelationships with the proposed project is provided in Table 1.

DESCRIPTION OF THE PROPOSAL

The Northern Tier Pipeline Company proposes to construct and operate a common-carrier crude oil transportation system. It is proposed to accomplish two major objectives: to provide a reliable source of crude oil for refineries in the Northern Tier states and other inland states for the next 20 or more years, and to provide an improved system for transporting Alaskan crude oil to states east of the Rocky Mountains.

The NTPC system would consist of tanker unloading facilities at Port Angeles, Washington, two submarine pipelines connecting the unloading berths to an onshore storage facility (fig. 1) and a pipeline approximately 1,557 miles long (fig. 2). There would be intermediate delivery facilities at three locations in Montana and North Dakota where the NTPC pipeline would cross existing crude oil pipelines. The pipeline terminus at Clearbrook, Minnesota, would have delivery facilities to provide crude oil to two existing pipeline systems which serve some Northern Tier and eastern states. As a result of the reduction of Canadian exports, these pipelines are currently operating at less than full capacity. Therefore, the NTPC proposal would contribute to the efficient use of existing crude oil transportation facilities.

Tanker Unloading Facilities

The tanker unloading facilities would be at Port Angeles, Washington, which has a large natural, well-protected, deepwater harbor. Two fixed tanker berths would be built in approximately 100 feet of water. No dredging of the harbor bottom would be necessary.

TABLE 1

GOVERNMENTAL AGENCIES HAVING PROJECT APPROVAL REQUIREMENTS

Government	Responsible Agency or Subdivision	Activity Requiring Approval	Agency Action
United States	Department of Agriculture Forest Service	Pipeline construction, road construction and use of roads	Permits and special use permits to establish terms and conditions of construction for Forest Service land.
	Department of Army Corps of Engineers	Dredging and construction in harbor and underwater pipeline construction across navigable rivers	Permits and easements for work in navigable waters, at stream crossings and across Departmental lands.
	Environmental Protection Agency	Construction and installation of transfer piping and storage tanks, disposal of dredge material, waste water discharges and pollution of air	Permitting authority for industrial sources of air pollution and issues or oversees pollution discharge elimination system permits (NPDES).
	Federal Communications Commission	Operation of microwave equipment and radio communications	Notification and licensing.
	Department of the Interior Bureau of Land Management	Construction on or over federal lands and activities involving cultural resources	BLM is the agency responsible for preparation of the Environmental Statement and issues right-of-way permits to cross over federal lands, after consultation with concerned agencies. Consults with Advisory Council on Historic Preservation and the Historic Conservation and Recreation Service concerning identification, protection, mitigation

TABLE 1 (Continued)

GOVERNMENTAL AGENCIES HAVING PROJECT APPROVAL REQUIREMENTS

Government	Responsible Agency or Subdivision	Activity Requiring Approval	Agency Action
			for, and enhancement of cultural resources.
	National Park Service	Construction on or across national parks	Construction permits and consultation regarding air pollution effects of projects, even when construction is not on National Park Service land.
	Bureau of Reclamation	Pipeline construction across irrigation districts	Amended easements and permits for crossing any Bureau of Reclamation right-of-way.
	Bureau of Indian Affairs	Pipeline construction over tribal, individually owned, and tribal-owned lands	Easements if application is approved by tribal councils which can grant or refuse permission to cross tribal land.
	Fish and Wildlife Service	Construction on or across national wildlife refuges or wetland production areas	Issues crossing agreement contracts and examines applications for Corps of Engineers, Sec. 10 and 404 permits and approves or recommends denial.
	Department of Transportation, Federal Aviation Administration	Construction on or near airports	Receives and approves notification of construction.

TABLE 1 (Continued)

GOVERNMENTAL AGENCIES HAVING PROJECT APPROVAL REQUIREMENTS

Government	Responsible Agency or Subdivision	Activity Requiring Approval	Agency Action
	Coast Guard	Construction in navigable waters, operation of marine facilities, oil transfer operations, and shipping	Issues permits for aides to navigation; designates anchorage areas, permits overhead crossings of navigable waters.
	Office of Pipeline Safety	Construction, operation and maintenance, and abandonment of pipeline	Approves material criteria and establishes specifications for certain construction and testing procedures.
	Department of Energy Bonneville Power Administration	Pipeline construction across, adjacent to, or joint use of BPA powerline rights-of-way.	Joint use permit.
Washington State	Energy Facility Site Evaluation Council	Construction and operation of marine terminal and pipeline	Makes recommendations to Governor regarding certification. Supercedes all State agencies. Can preempt local governments.
Idaho State	Department of Lands	Construction across state lands and stream crossings	Rights-of-way permits.
	Department of Water Resources	Appropriation of water and stream alterations	Permit.
	Department of Transportation	Crossing or use of state road rights-of-way	Easements.
	Department of Health	Activities affecting air and water quality, waste disposal, use of X-rays	Issues permits and acts as as certifying agency for Corps of Engineers 404 permits under Clean Water Act.

TABLE 1 (Continued)

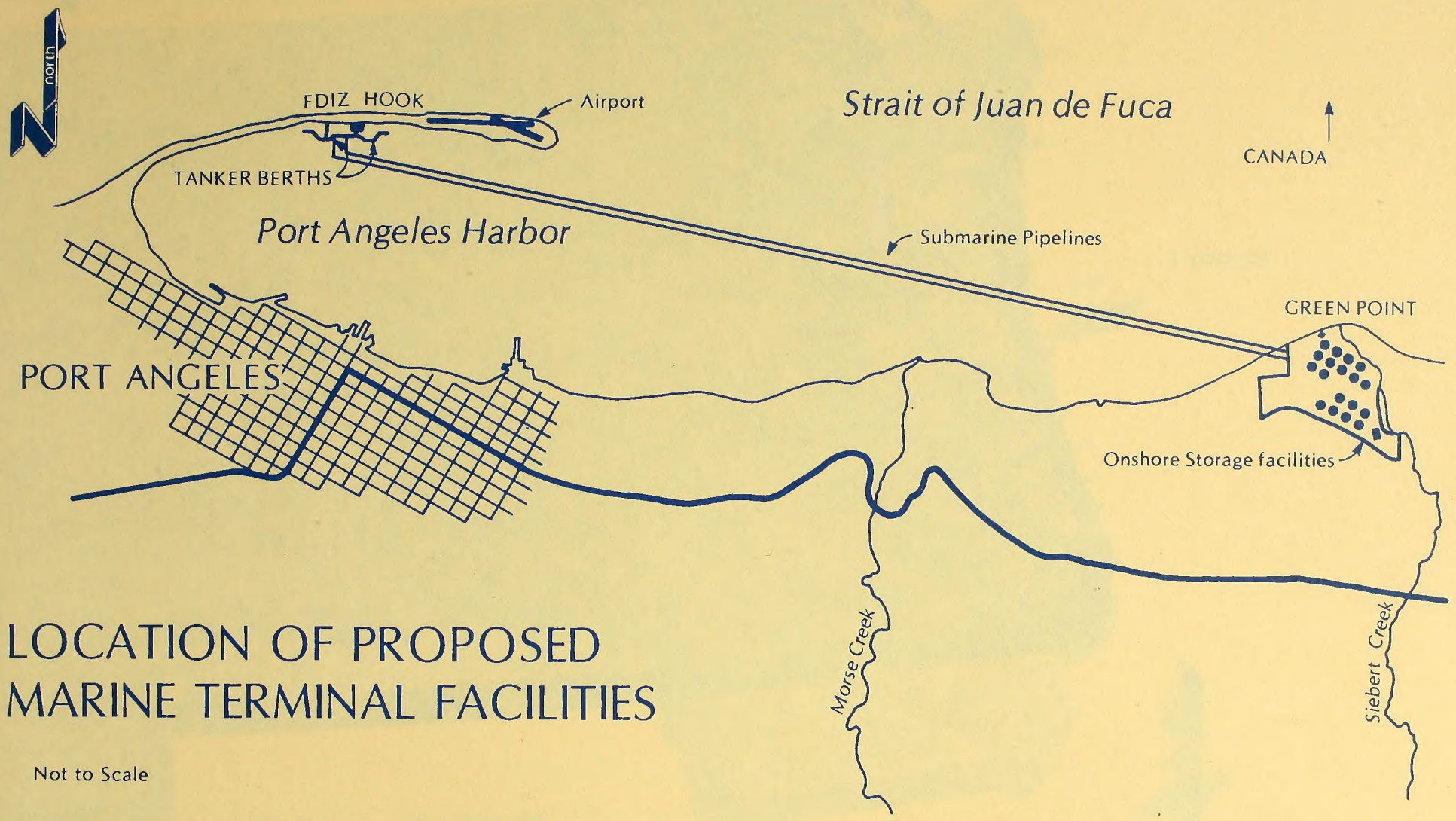
GOVERNMENTAL AGENCIES HAVING PROJECT APPROVAL REQUIREMENTS

Government	Responsible Agency or Subdivision	Activity Requiring Approval	Agency Action
Montana State	Department of Natural Resources	Crossing state forest lands	Rights-of-way permit. Responsible for state ES. Issues flood plain and stream crossing permits, when local entities do not exercise authority.
	Highway Department	Crossing state highways	Permits.
	Department of Health and Environmental Sciences	Construction affecting air and water quality	Certificates required for stream crossings if turbidity affected.
	Department of State Lands	Crossing state lands	Easements.
	County commissions	Crossing flood plains	Permits.
	Conservation districts	Stream crossings	Permit.
North Dakota State	Public Service Commission	Application for corridor and route	Certification and permits.
	Water Commission	Stream and water crossings ings and applications to appropriate water	Permits.
	Highway Department	Crossing state highways	Permits.
	Lands Department	Crossing state land	Permits.
	Department of Health	Actions affecting air and water quality and solid wastes	Permits.

TABLE 1 (Continued)

GOVERNMENTAL AGENCIES HAVING PROJECT APPROVAL REQUIREMENTS

Government	Responsible Agency or Subdivision	Activity Requiring Approval	Agency Action
	Counties and townships	Crossing other than state roads	Permits.
		Actions affecting zoning ordinances	Certificate of compliance.
Minnesota State	Energy Agency	Application for pipeline project	Certification of need. This action necessary before other state actions can proceed.
	Department of Natural Resources	Proposal for pipeline project	Writes state ES, approves eminent domain, issues permits for water crossings and rights-of-way.
	Environmental Quailty Board	Presentation of ES	Issues compliance approval required by state Environmental Policy Act.
	Pollution Control Agency	Pipeline construction affecting water quality and waste disposal	Permits for hydrostatic test water discharge and tank storage. Also certifies water crossing permits given by Corps of Engineers.
	Department of Transportation	Crossing state and interstate roads	Permits.
	Counties	Crossing other than state roads	Variable.



LOCATION OF PROPOSED MARINE TERMINAL FACILITIES

Not to Scale

Source: Northern Tier Pipeline Company

Figure 1.

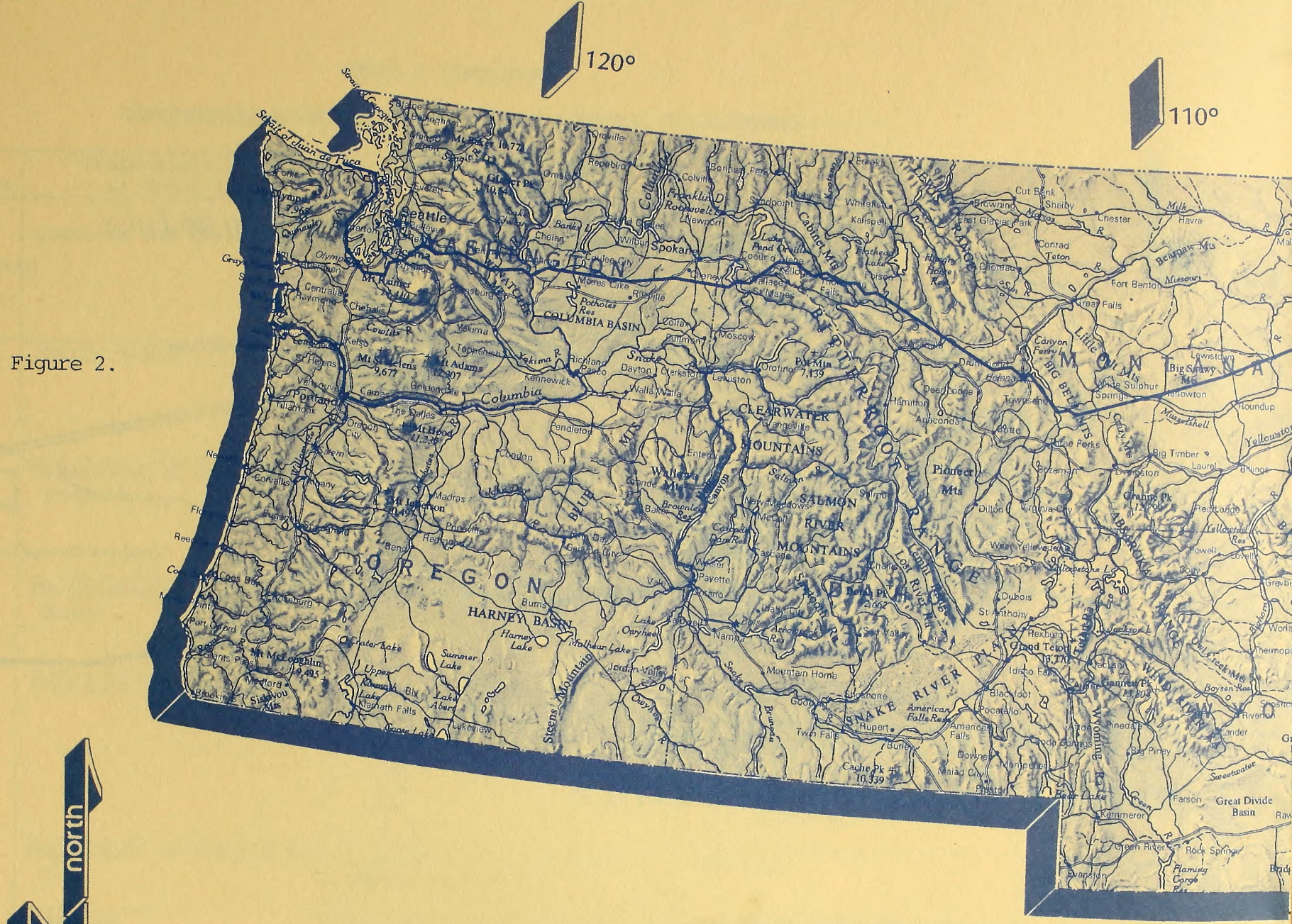
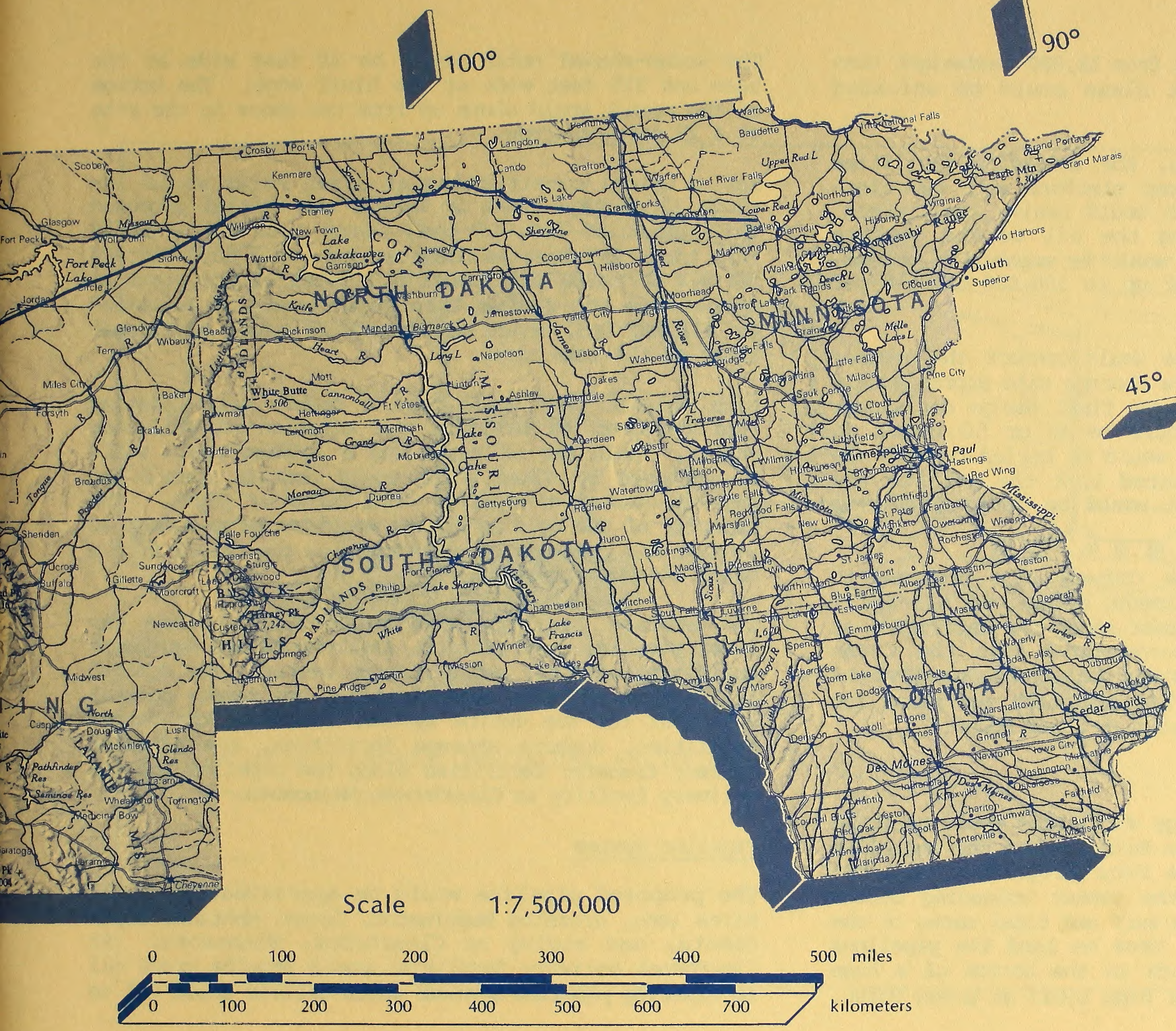


Figure 2.

GENERAL REFERENCE


100°
90°
45°
40°
NORTH DAKOTA
SOUTH DAKOTA
MINNESOTA
IOWA
Lake Sakakawea
Fort Peck Lake
Duluth
Superior
Minneapolis
St Paul
Des Moines
Cedar Rapids
Bismarck
Pierre
Fort Pierre
Mississippi
Missouri
Black Hills
Badlands
Harney Pk. 7,242
Eagle Mtn 2,301
Scale 1:7,500,000
0 100 200 300 400 500 miles
0 100 200 300 400 500 600 700 kilometers

Two tankers ranging in size from 18,000 deadweight tons (dwt) to the 300,000 dwt class could be unloaded simultaneously (fig. 3).

In addition to the berths, the unloading facilities would include a booster pump platform with two electrically driven pumps which would assist the tankers' unloading pumps in moving the oil to the onshore storage tanks. The system would be capable of unloading crude oil at a rate of up to 100,000 barrels per hour per berth.

The two submarine pipelines would connect the booster pump platform to the onshore storage site approximately 6 miles away. Depending upon final design decisions, the submarine pipelines would be 48 or 52 inches in diameter. These pipelines would be buried beneath the seabed and it is anticipated that the area of the harbor above the pipelines would be designated as a restricted anchorage zone.

The Northern Tier Pipeline Company also proposes to include oil-spill containment booms, an oil-spill recovery vessel and a fireboat among the facilities at Port Angeles. The Company would join the Clean Sound Cooperative, a Seattle based cooperative of petroleum companies which has equipment and plans for cleanup of any large oil spill in Puget Sound.

Onshore Storage Facilities

The proposed onshore storage facilities would be built on a 294-acre site at Green Point, above the shoreline of the Strait of Juan de Fuca (fig. 4). The two submarine pipelines from the tanker unloading berths would be buried beneath the surf and tidal zones of the beach below Green Point. Once on land the pipelines would be placed in a trench in the bottom of a huge notch cut into the 100-foot high bluff at Green Point. The wedge-shaped notch would be 40 feet wide at the base and 325 feet wide at the bluff edge. The bottom of the trench would slope up from tne shore to the site at a 25 percent grade.

The original construction at Green Point would include 11 storage tanks to handle the initial proposed throughput of 709,000 bpd. Each tank would be 56 feet high, 285 feet in diameter and would hold 545,000 barrels of crude oil. Within 5 years of the start of operations the system throughput would be expanded to 933,000 bpd, which would require seven additional tanks of the same size.

Each storage tank would have a double seal floating roof designed to minimize the emission of polluting vapors. Each set of tanks and a holding basin would be enclosed by dikes which would contain runoff and any oil leaked or spilled from tanks or pipes. The capacity of the holding basins would be large enough to contain the contents of one tank plus the runoff from a major 24-hour rainstorm.

The storage facility site would also include the first pipeline pump station, maintenance and equipment buildings, offices, and a control center. The control building would house communications and remote control equipment for the entire system, including the harbor facilities, onshore storage facilities, the pipeline system, transfer facilities along the pipeline and the delivery facility at Clearbrook, Minnesota.

Pipeline System

The proposed pipeline would be approximately 1,557 miles long, crossing Washington, Idaho, Montana, North Dakota, and ending at Clearbrook, Minnesota. At Clearbrook delivery facilities would provide crude oil to existing pipeline systems which deliver crude oil to

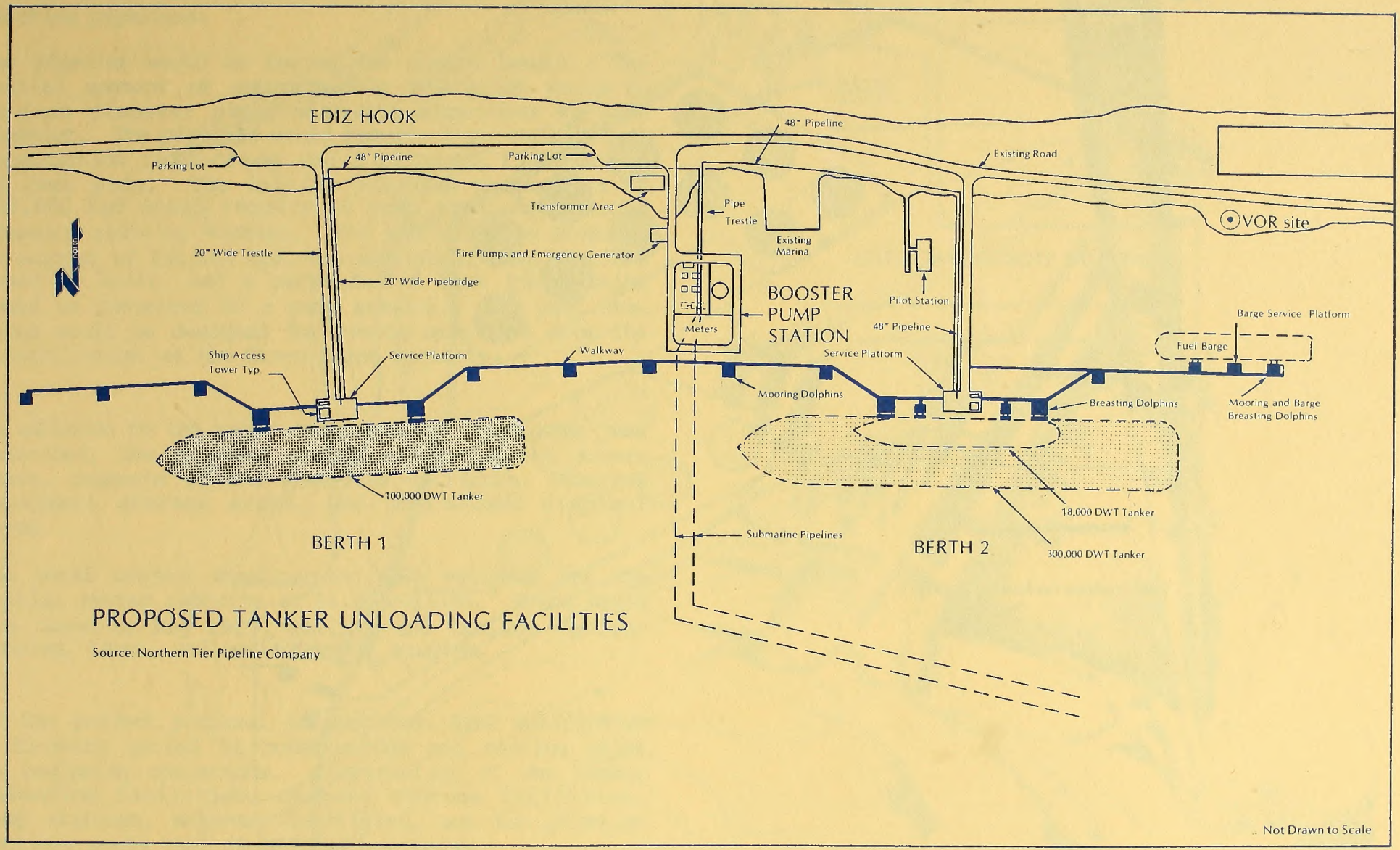
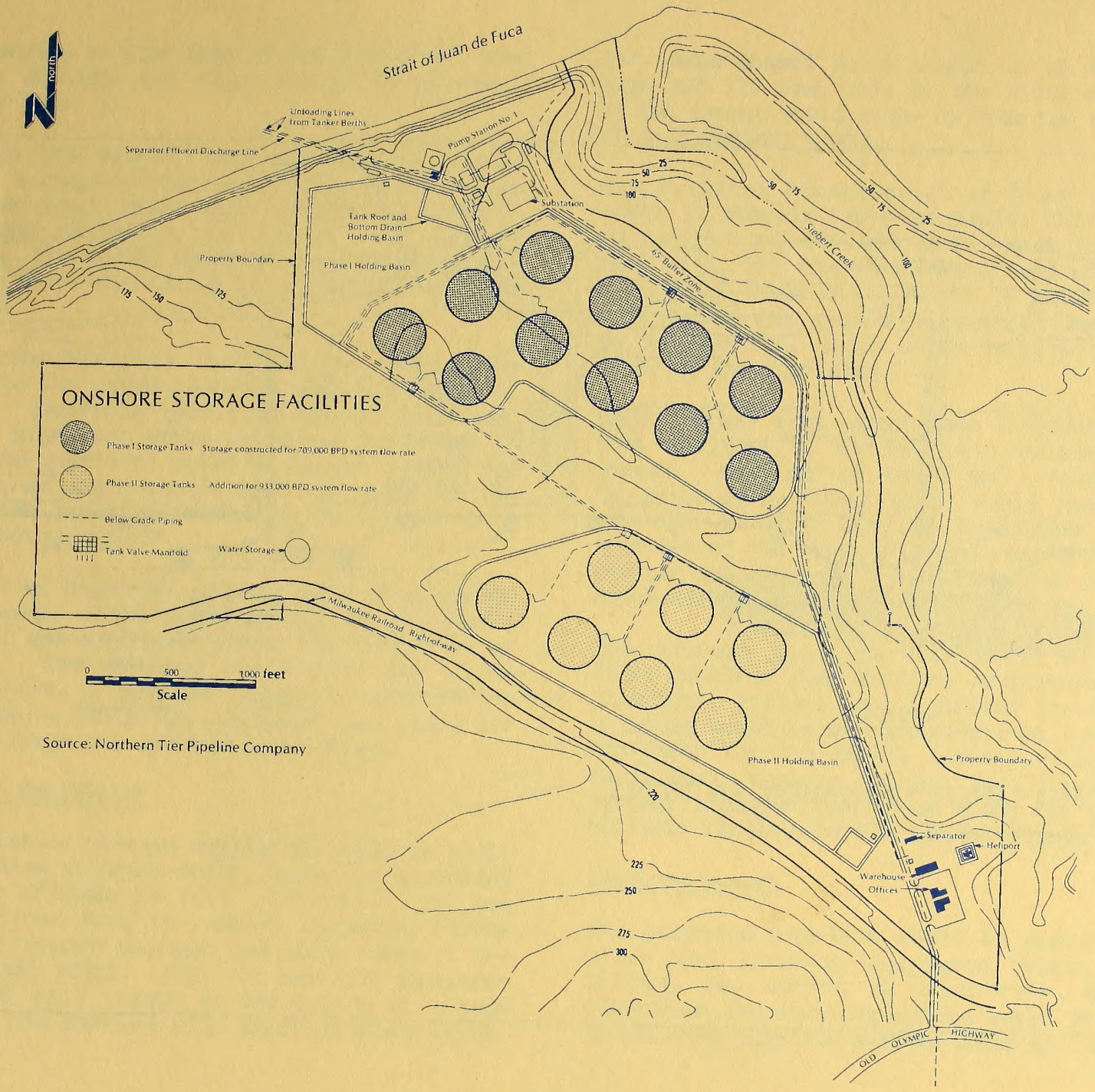

EDIZ HOOK
48" Pipeline
Parking Lot
48" Pipeline
Parking Lot
Existing Road
Transformer Area
Pipe Trestle
VOR site
Existing Marina
20" Wide Trestle
Fire Pumps and Emergency Generator
20" Wide Pipebridge
BOOSTER PUMP STATION
Pilot Station
Barge Service Platform
Meters
48" Pipeline
Fuel Barge
Ship Access Tower Typ
Service Platform
Walkway
Service Platform
Mooring Dolphins
Breasting Dolphins
Mooring and Barge Breasting Dolphins
100,000 DWT Tanker
18,000 DWT Tanker
Submarine Pipelines
BERTH 1
BERTH 2
300,000 DWT Tanker
PROPOSED TANKER UNLOADING FACILITIES
Source: Northern Tier Pipeline Company
Not Drawn to Scale

Figure 3.



Source: Northern Tier Pipeline Company

Figure 4.

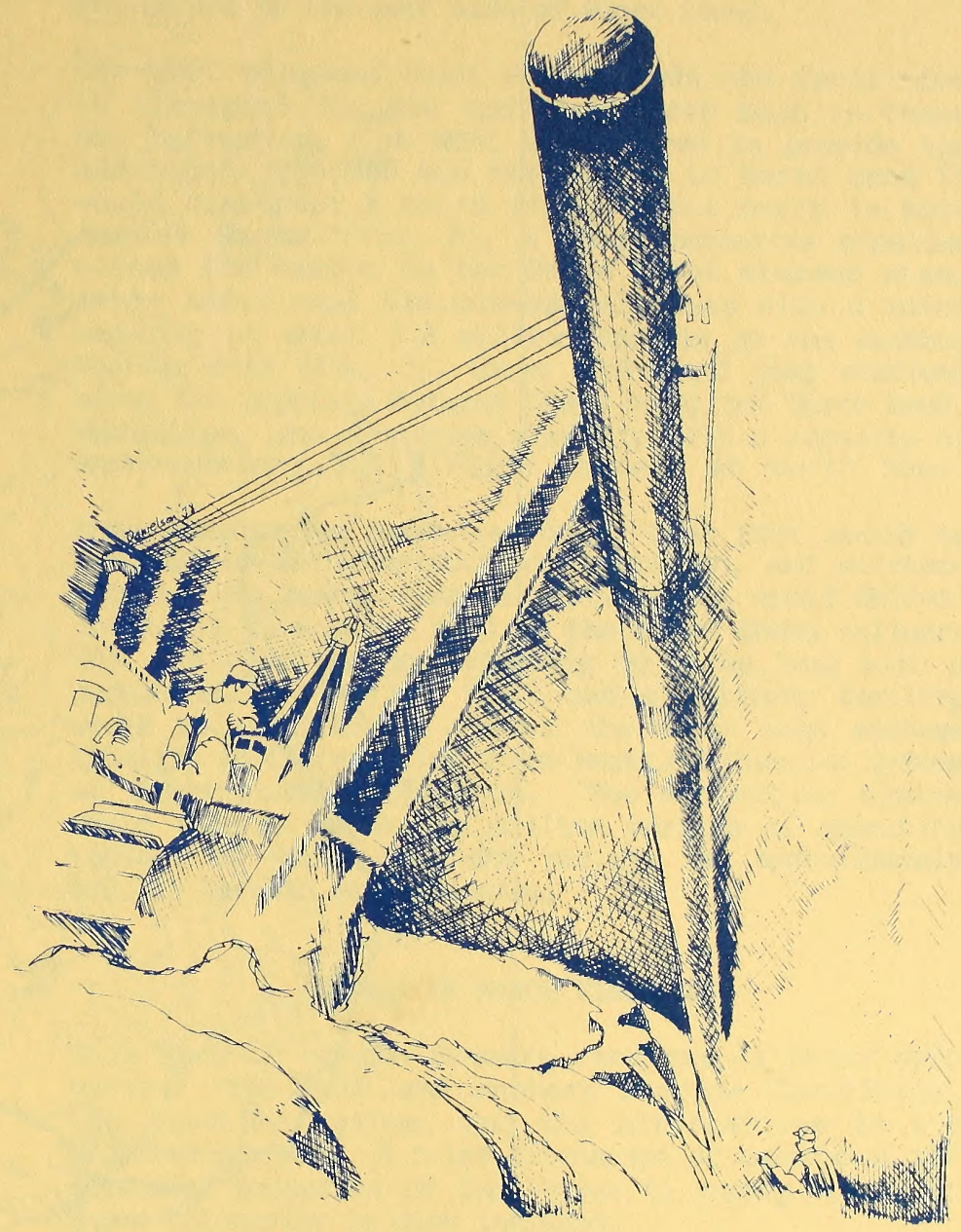
refineries in midwestern and eastern states. There would also be delivery facilities at three intermediate locations, two in Montana and one in North Dakota, where the Northern Tier Pipeline would cross existing pipelines.

The pipeline would be buried its entire length. The initial segment of approximately 849 miles would be 42-inch diameter pipe, with the remainder 40-inch diameter. The pipeline would require a minimum 90-foot construction right-of-way and a permanent right-of-way 75 feet wide. The initial proposed throughput of 709,000 bpd would require 19 pump stations and one pressure reducing station. For the ultimate proposed throughput of 933,000 bpd, two additional pump stations would be built, and a surge relief tank installation would be converted to a pump station. All pump stations would be designed for remote operation from the control center at the Green Point facility.

In addition to the major components of the system just described, the proposed project would require access roads, segments of new powerline corridors, numerous equipment storage areas, and borrow and disposal areas.

The total project construction cost estimate for the initial system capacity is $1.15 billion. These costs are based on May 1978, dollars and include contingencies, taxes, and environmental studies.

If the project proposal is approved, NTPC anticipates a 22-month period of construction and testing prior to beginning operations. Construction of the tanker unloading facilities, onshore storage facilities, pump stations, delivery facilities, and ten pipeline sections would take place simultaneously.



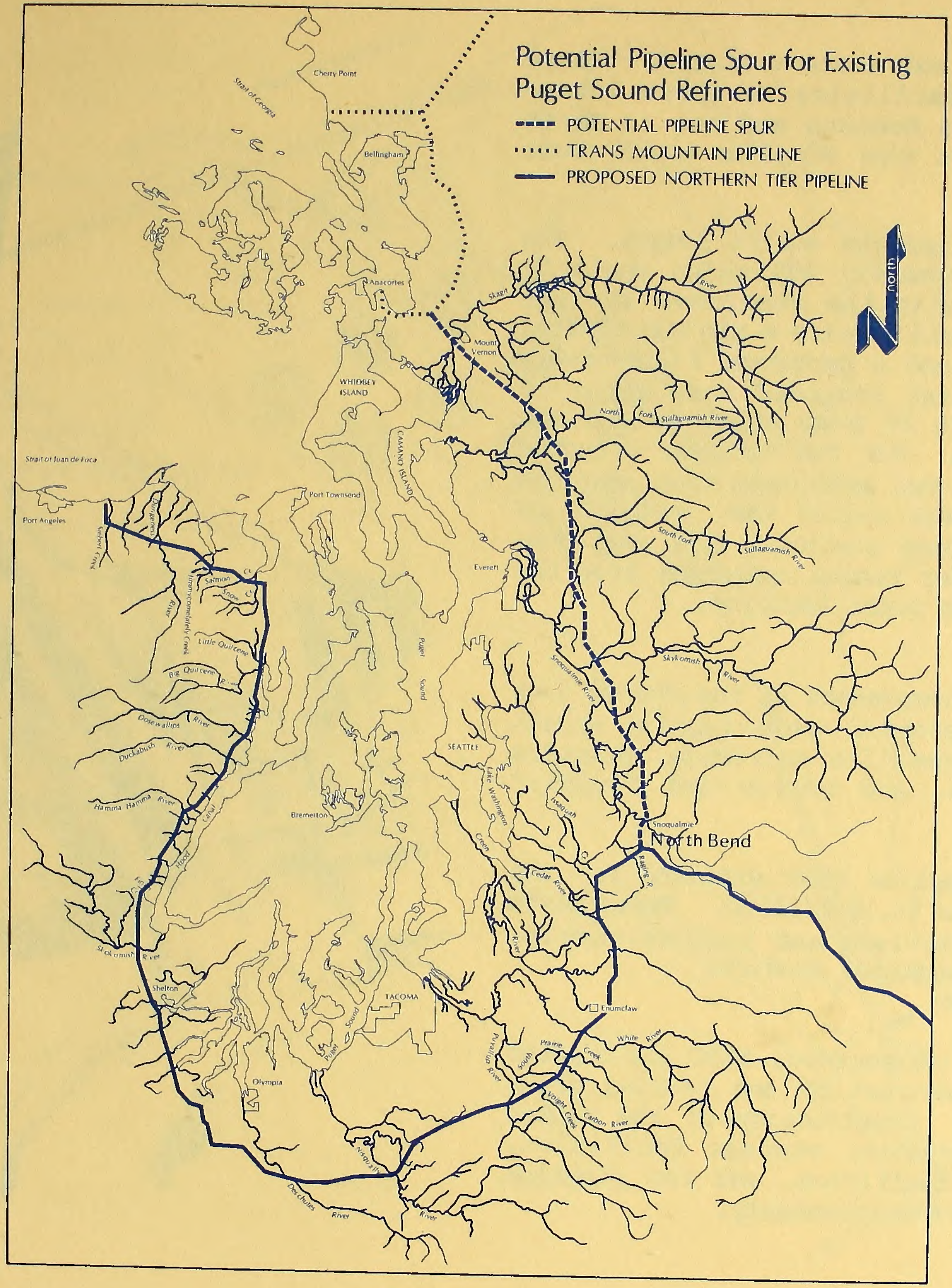

Potential Pipeline Spur for Existing Puget Sound Refineries
POTENTIAL PIPELINE SPUR
TRANS MOUNTAIN PIPELINE
PROPOSED NORTHERN TIER PIPELINE
north
Cherry Point
Strait of Georgia
Bellingham
Anacortes
Skagit
River
Mount Vernon
WHIDBEY ISLAND
CAMANO ISLAND
North Fork Stillaguamish River
South Fork Stillaguamish River
Strait of Juan de Fuca
Port Angeles
Port Townsend
Everett
Puget Sound
Snoqualmie River
Skykomish River
SEATTLE
Lake Washington
Bremerton
Snoqualmie
North Bend
Cedar River
TACOMA
Enumclaw
White River
Carbon River
Olympia
Shelton
Skokomish River
Hood Canal
Duckabush River
Dosewallips River
Big Quilcene R.
Little Quilcene
Salmon Cr.
Snow Cr.
Deschutes River

Figure 5.

The proposed project has a 20-year economic lifetime. However, many pipelines have operated for 30 to 50 years and the NTPC project would be designed to operate for a longer period than 20 years.

Potential Expansion to Supply Puget Sound Refineries

The issues of tanker traffic in Puget Sound and the possibility of development of a crude oil transshipment facility in Washington state waters have generated widespread interest and controversy during the past several years. One outcome of the discussions raised by these issues was the decision by former Washington Governor Daniel J. Evans to add a policy statement to the Washington Coastal Zone Management Program. The statement indicates that the state "positively supports the concept of a single, major crude petroleum receiving and transfer facility at or west of Port Angeles" and that the facility "shall be designed to include provisions to supply existing refineries in Whatcom and Skagit Counties" on the east side of Puget Sound.

In July 1977, Washington Governor, Dixie Lee Ray, requested of the Secretary of Commerce that the Evans Policy Statement be deleted from the approved Washington Coastal Zone Management Program. The Department of Commerce is preparing an environmental statement prior to making a decision on the request. The Draft Environmental Statement considering the proposed deletion was filed with the EPA November 17, 1978.

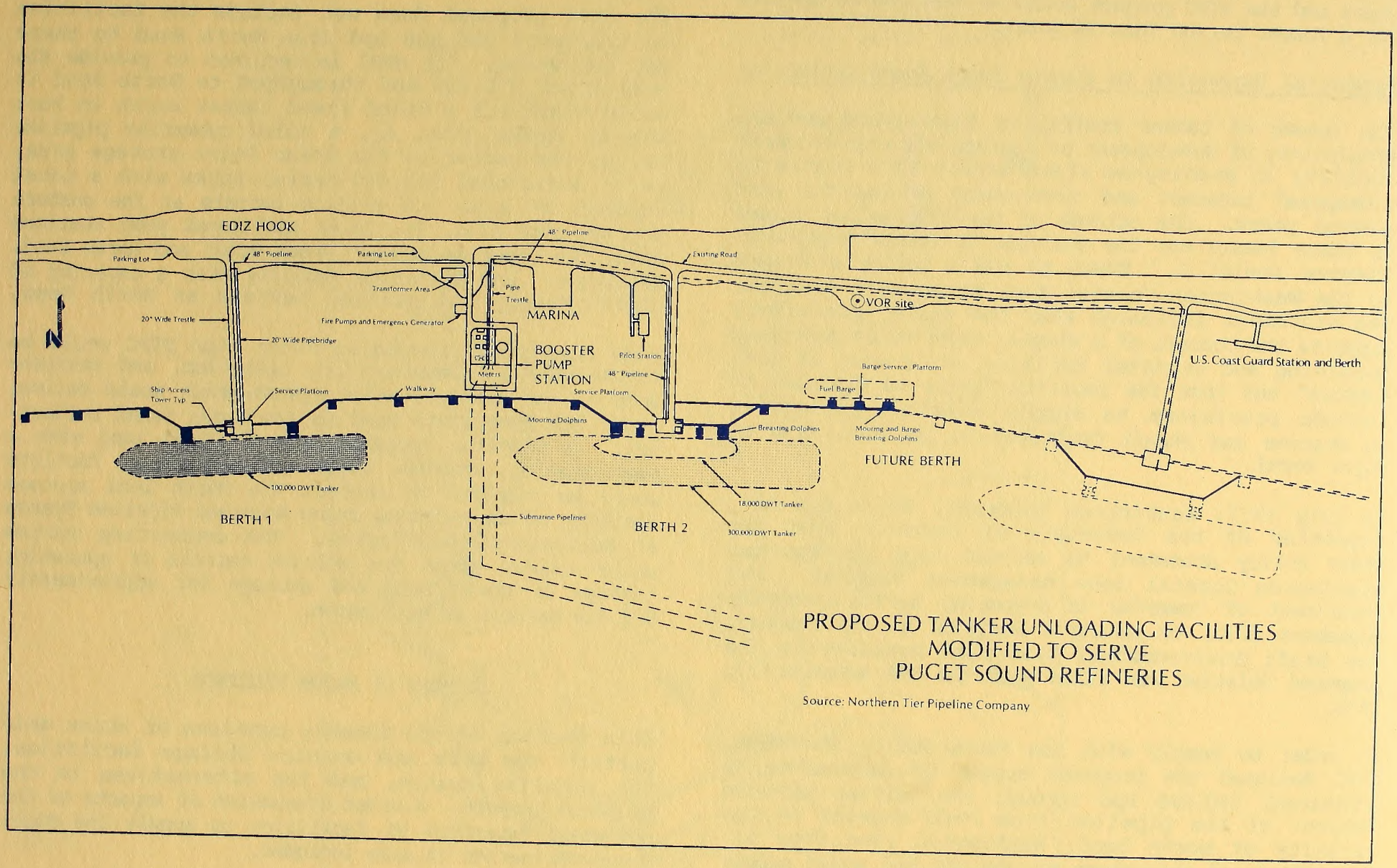
In order to comply with the Evans Policy Statement, NTPC designed the proposed system to accommodate an additional 350,000 bpd through the initial 185-mile segment of the pipeline from Port Angeles to the vicinity of North Bend, Washington (see fig. 5). The additional throughput of 350,000 bpd would supply the combined demand for crude oil of the four existing refineries on the east side of Puget Sound.

The NTPC proposal does not include the facilities to transport 350,000 bpd from North Bend to these Set refineries. If NTPC is required to provide the additional 350,000 bpd throughput to North Bend it would construct a third fixed tanker berth in Port Angeles Harbor (fig. 6), a third submarine pipeline across the harbor to the Green Point storage area, seven additional 545,000-barrel tanks with a total capacity of about 3.8 million barrels at the onshore storage site (fig. 7), three additional pump stations along the pipeline between Green Point and North Bend, Washington, and a storage facility with a capacity of approximately 2.1 million barrels at North Bend.

Some company or companies other than NTPC would be responsible for construction, operation, and maintenance of the transportation system which would deliver crude oil from North Bend to the Puget Sound refineries. A pipeline approximately 80 miles long with a pump station, storage tanks and a delivery facility would be required to connect the North Bend storage facility to the existing Trans Mountain Pipeline System at Burlington, Washington. The connecting system would require about one million barrels of operating tankage at North Bend and storage for approximately 500,000 barrels at Burlington.

SUMMARY OF MAJOR FINDINGS

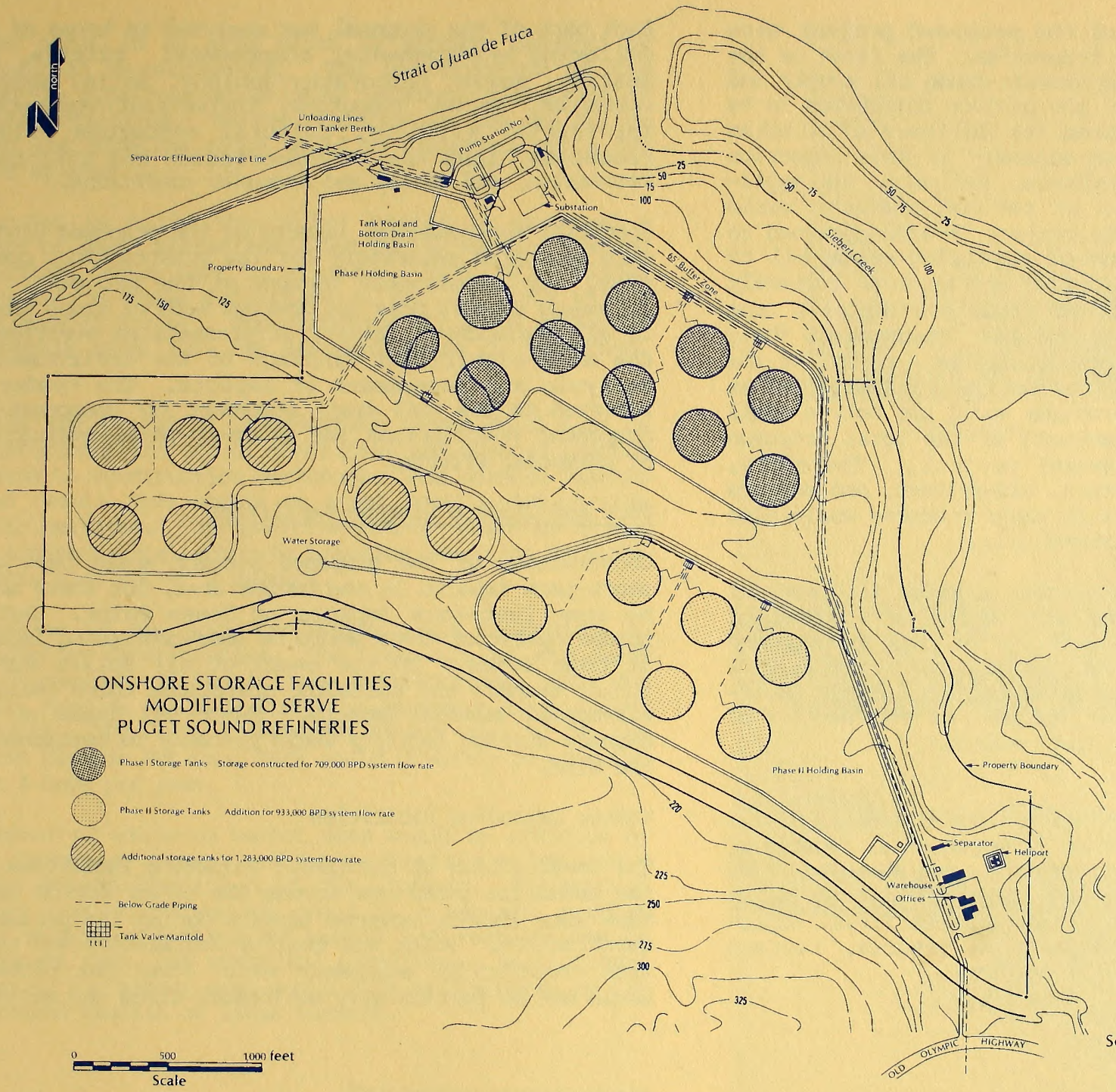
This section of the Summary consists of three main parts: the port and onshore storage facilities, the pipeline system, and the alternatives to the proposed project. A brief discussion of impacts of the potential expansion of facilities to supply the Puget Sound refineries is also included.



PROPOSED TANKER UNLOADING FACILITIES
MODIFIED TO SERVE
PUGET SOUND REFINERIES

Source: Northern Tier Pipeline Company

Figure 6.



Source: Northern Tier Pipeline Company

Figure 7.

The potential effects of the proposed project were assessed in two distinct frameworks. The first is the larger context of the nationwide crude oil supply and demand situation. One of the project objectives is to provide an improved system for delivery of Alaskan crude oil to the lower 48 states. If this objective is achieved, the oil producers, refiners, the applicant, and the consumers of refined products would benefit economically. The project is also designed to provide a reliable means of supplying crude oil to refineries in the Northern Tier states which currently are faced with a cut off of crude oil supplies from Canada. These refineries and the consumers of their products could benefit economically as a result of the NTPC proposal. However, the refineries identified as having critical supply problems would use only a small portion (perhaps 10-15 percent) of the total proposed throughput of the proposed project. Therefore, other refineries in northern, mid-western, and eastern states, and the consumers of their products would also be expected to benefit economically.

The second analytical framework in which the proposal has been studied is the more detailed context of the actual effects of construction, operation, and abandonment of the proposal on the human and natural environment. Most of the contents of the Draft Environmental Statement and the remainder of this section of the Summary is devoted to this analysis.

The analysis of the proposed project consisted of two categories of impacts. First, the potential impacts of the construction, normal operation, and abandonment of all facilities were evaluated. Second, the potentially adverse impacts resulting from possible fires, explosions, oil spills or leaks from vessels, storage tanks, and the pipeline were analyzed.

Each part of the proposal was analyzed in terms of the following environmental components: climate, air quality, noise, topography/geology, soils, aquatic resources, marine resources, terrestrial vegetation, terrestrial wildlife, cultural resources, visual resources, land use, transportation and utilities, recreation, and social and economic conditions.

Potential environmental impacts of the proposed project were evaluated separately for the construction, operation, and abandonment phases of the project. The following summary does not address each of these phases in all instances. Rather, it presents an overview of the more significant findings of the environmental analysis and assessment of impacts. The reader is referred to the full draft statement for component-by-component descriptions and phase-by-phase evaluations of potential effects.

Port and Onshore Storage Facilities

Construction of the proposed project would have only short-term impacts in the harbor area, but there would be some long-term impacts at Green Point. During normal operation there would be some continuing impacts at both sites. In the event of oil spills during tanker transit and unloading operations there could be widespread adverse impacts. Minor oil leaks at the onshore storage facility would probably be contained on the site.

Tanker Unloading Facilities

The construction of the tanker unloading facilities and the submarine pipelines across the harbor bottom would have some locally adverse impacts during the period of construction. Minor air quality degradation and noise from construction equipment would occur but probably would not be particularly noticeable since the activity

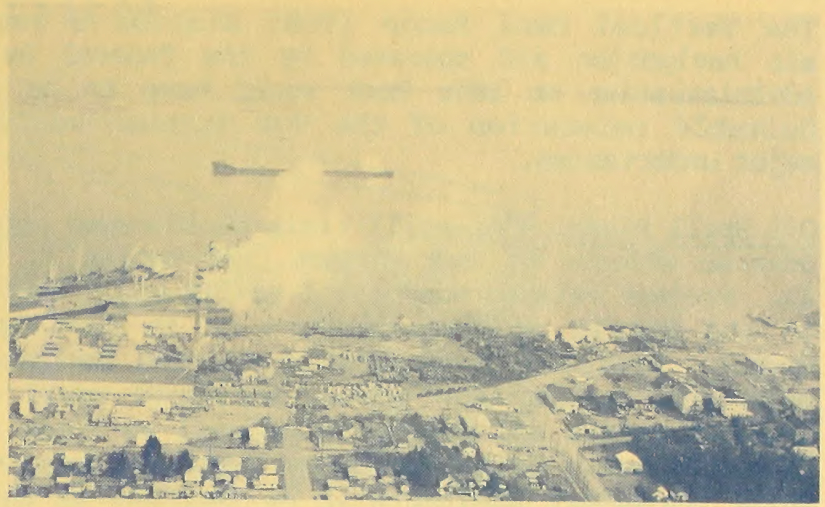
would occur in an area which is already occupied by industrial developments. The construction of the submarine pipelines would cause temporary disruption of harbor activities. Marine resources on the sea bottom along the pipeline route would be disturbed for a few years at most.

In order to build the tanker berths as proposed a number of small recreational and public service boating facilities would have to be moved. NTPC is committed to replacing these facilities at new locations within Port Angeles harbor. Approximately 112 acres of harbor presently used for log storage would be impacted.

During the period of construction there would also be an interconnected set of beneficial and adverse impacts related to construction personnel. The adverse impacts would result from strain on local housing and certain public services. The positive effects would be direct and indirect local economic benefits resulting from the construction worker's payroll.

Operation of the port facilities would contribute to air quality deterioration. The Clean Air Act standards for Prevention of Significant Deterioration (PSD) for sulfur dioxide would probably be exceeded about 2 days per year. The Class I Standards of air quality for the nearby Olympic National Park would probably be exceeded 3 or 4 days per year.

A number of existing harbor uses would be affected by the increased tanker and barge traffic which would occur during operation of the project. Commercial vessel traffic congestion could be a sporadic problem as a result of numbers of vessesl and restrictions on anchorage over the submarine pipelines. Recreational usage of the harbor area would also be disrupted by the increased traffic of large tankers.



Photos from Bureau of Land Management

The Vertical Omni Range (VOR) Station a regional air navigation aid operated by the Federal Aviation Administration on Ediz Hook would have to be moved. Suitable relocation of the VOR Station would be a major undertaking.

Oil Spill Risks. Oil-spill risks would cause potential adverse effects of the project (see tables 2, 3, and 4). Project related marine oil spills could take place in the Strait of Juan de Fuca or in Port Angeles Harbor. Preliminary trajectory analyses indicate that major oil spills from tanker accidents would affect Canadian waters and shorelines as well as those of the United States. Updated analyses based on ongoing oil-spill trajectory studies will be included in the FES.

Marine plants and animals, water quality, shorelines and beaches, waterfowl, boats, and harbor equipment and air quality could all be affected by oil spills. Economic impacts would include loss of income for fishermen and tourist businesses as well as the potentially enormous costs of cleanup.

The estimated frequencies of oil spills of various magnitudes from in-transit and at-berth tankers and from bunker fuel barges are shown in tables 2, 3, and 4.

Small oil spills (less than 100 gallons) occurring during oil transfer operations would probably be fairly frequent events. It is likely that they would all be contained and cleaned up by in-place equipment as a part of routine operating procedures. The duration of individual operational spills would probably be short and the direct impacts minimized. However, there could also be some cumulative adverse impacts from these small spills on water quality and marine plants and animals. These impacts would probably not extend beyond the harbor area, but could cause long-term disruptions of existing conditions.

Photos from Bureau of Land Management

EFFECT OF OIL ON THE MARINE ECOSYSTEM

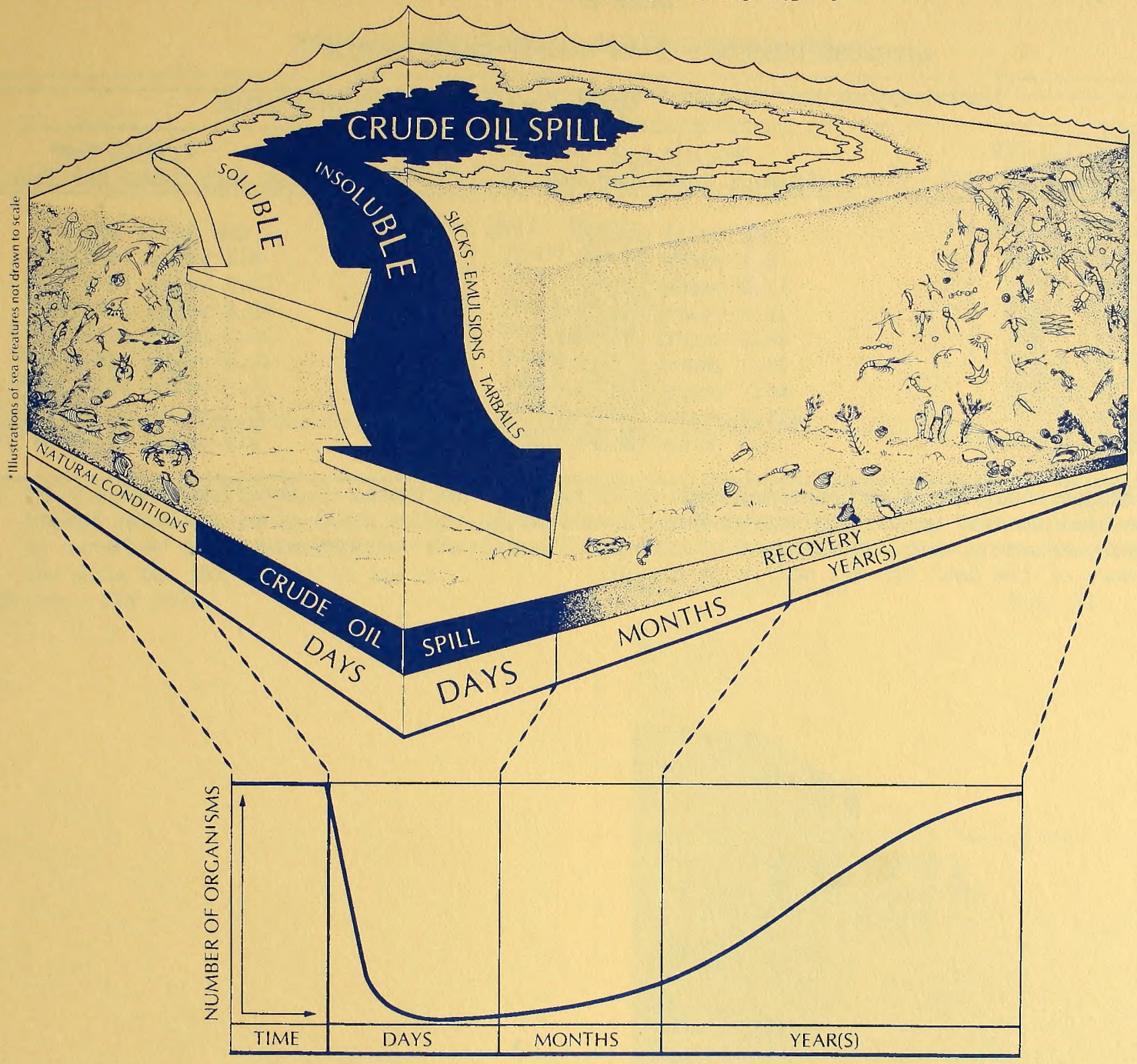


TABLE 2

ESTIMATED FREQUENCY OF IN-TRANSIT TANKER SPILLS

Spill Magnitude (in barrels)	Spill Frequency and Uncertainty 1/	
	709,000 bpd 300 Port Calls Per Year	933,000 bpd 395 Port Calls Per Year
	One spill every:	One spill every:
2.4 - 10	8.1 years (5-28)	6.1 years (4-21)
10.1 - 50	17.9 years (11-61)	13.6 years (8-47)
50.1 - 100	78.4 years (46-268)	59.4 years (35-204)
101 - 200	46.8 years (28-160)	35.5 years (21-122)
201 - 2,000	59.1 years (35-202)	44.8 years (26-154)
2,001 - 10,000	46.8 years (28-160)	35.3 years (21-122)
>10,000	116.4 years (68-398)	88.2 years (52-302)
Any spill $\geq$ 2.4	3.8 years (2.3-13.1)	2.9 years (1.7-10)

1/ The ranges shown in parentheses for each spill size are estimates of the 95 percent confidence limits based on the derived historical in-transit tanker spill rate, and were calculated by assuming that the variance of each spill magnitude category was equal to the variance of the data for all spills in transit.

Source: OIW 1978.

TABLE 3

ESTIMATED FREQUENCY OF AT-BERTH TANKER SPILLS

Spill Magnitude (in barrels)	Spill Frequency and Uncertainty[1]	
	709,000 bpd 300 Port Calls Per Year	933,000 bpd 395 Port Calls Per Year
	One Spill Every:	One Spill every:
2.4 - 10	1.0 years (0.7-1.7)	0.8 years (0.5-1.3)
10.1 - 50	2.8 years (2.0-4.7)	2.1 years (1.5-3.6)
50.1 - 100	20.9 years (15-35)	15.9 years (11-27)
101 - 200	30.5 years (22-51)	23.2 years (16-39)
201 - 2,000	27.9 years (20-47)	21.3 years (15-35)
2,001 - 10,000	134 years (9-224)	102 years (72-170)
>10,000	335 years (240-560)	225 years (180-425)
Any spill ≥ 2.4	0.67 years (0.48-1.12)	0.51 years (0.36-0.85)

[1] The ranges shown in parentheses for each spill are estimates of the 95 percent confidence limits based on the derived historical at fixed-berth tanker spill rate, and were calculated by assuming that the variance of each spill magnitude category was equal to the variance of the data for all spills at berth.

Source: OIW 1978.

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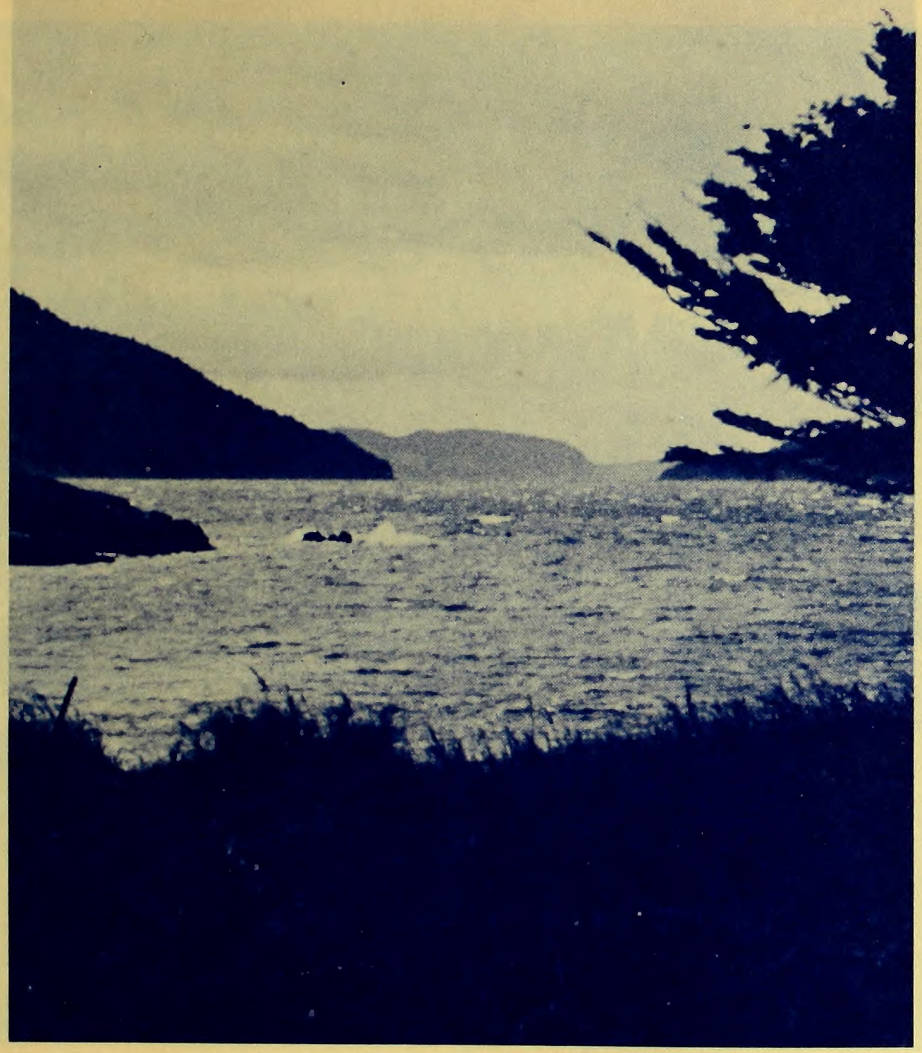
TABLE 4

ESTIMATED FREQUENCY OF FUEL BARGE SPILLS

Spill Magnitude (in barrels)	Spill Frequency and Uncertainty[1]	
	709,000 bpd 600 Port Calls Per Year	933,000 bpd 790 Port Calls Per Year
	One spill every:	On spill every:
2.4 - 10	2.41 years (1.54-5.26)	1.82 years (1.17-3.99)
10.1 - 50	7.32 years (4.69-16.0)	5.54 years (3.57-12.1)
50.1 - 100	33.2 years (21.3-72.3)	25.1 years (16.2-54.9)
101 - 200	44.6 years (28.6-97.1)	33.7 years (21.7-73.7)
201 - 2,000	40.0 years (25.6-87.2)	30.3 years (19.5-66.2)
> 2,000	82.1 years (52.6-179)	62.1 years (40.0-136)
Any spill ≥ 2.4	1.56 years (1.00-3.40)	1.18 years (0.76-2.58)

[1] The ranges shown in parentheses for each spill size are estimates of the 95 percent confidence limits based on a derived historical tank barge spill rate, and were calculated by assuming that the variance of each spill magnitude category was equal to the variance of the data for all tank barge spills.

Source: OIW 1978.



L. D. Mills

Less than total loss oil spills from tankers or bunker fuel barges would be relatively unlikely events. Any such spill would have adverse environmental and economic impacts. The severity of those impacts would depend upon the size and location of the spill, weather, sea conditions, season of year, and the speed and effectiveness of cleanup operations. Historical data and recent estimates indicate that damages and cleanup from a major oil spill would cost many tens of millions of dollars.

The risks of tanker or barge fires or explosions represent additional potential adverse impacts of the project. Ongoing studies to evaluate the probability and frequency of such events will be analyzed and incorporated into the FES.

In addition to the impacts related to the construction and operation of the proposed facilities, there is the issue of public reaction to the proposed project. While there are some people in Port Angeles in favor of development of the oil port, the residents are generally opposed to it. People have expressed their opposition in a variety of ways and continue to do so. A number of special interest groups have released statements in opposition to the project. Candidates expressing opposition to the project have been elected to office in both Port Angeles and Clallam County. Ordinances and land use plans with provisions which would prevent development of an oil transshipment facility have been approved by both the county and the city. In the 1976 election voters in Port Angeles passed a resolution against the proposed project.

Public opposition is largely based on the perception that the proposed oil terminal would be incompatible with existing industry, with current life style and scenic amenities, and with current trends and objectives for water and air quality improvement. The

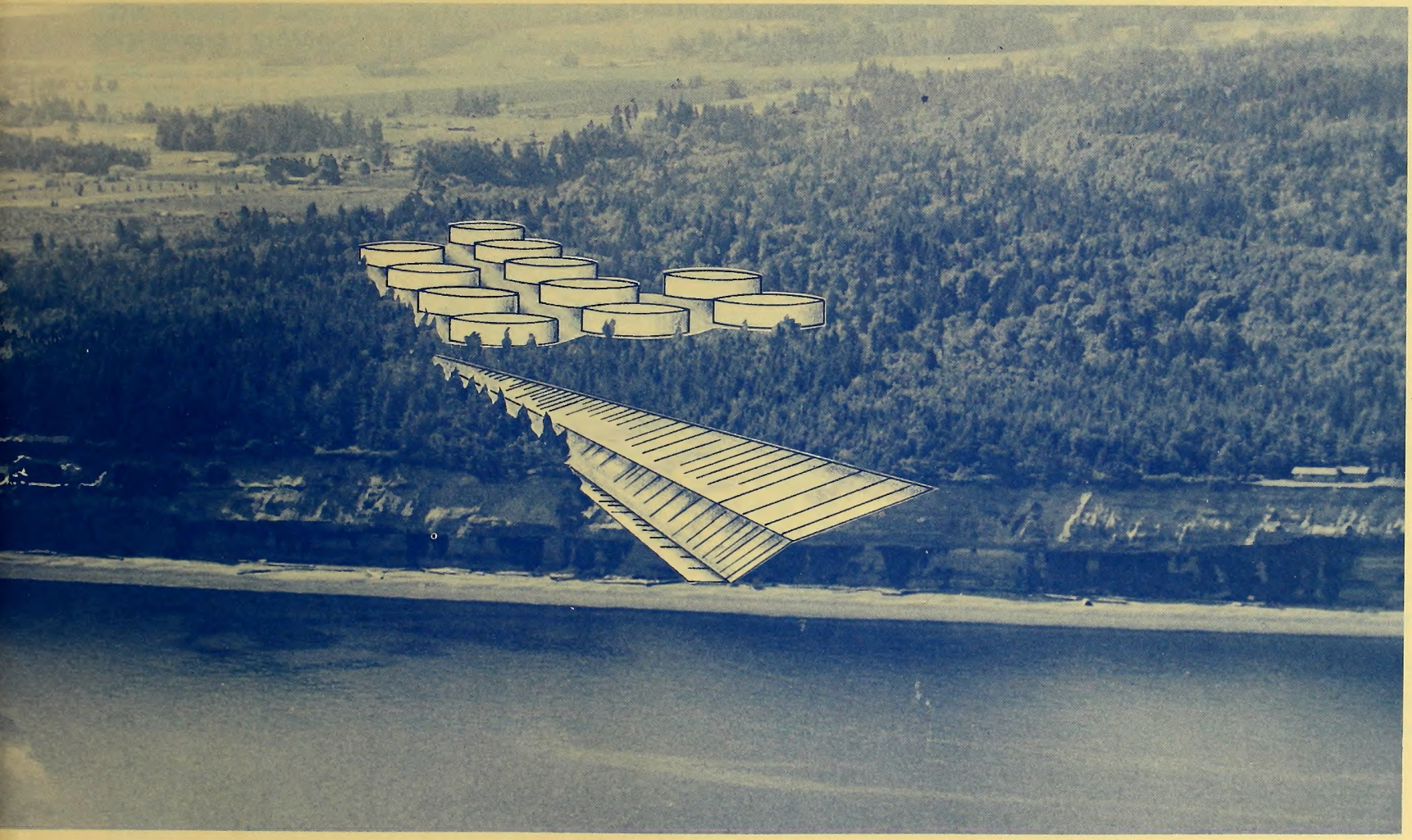
proposed project is perceived as a potential threat to health and safety and as carrying a greatly increased potential for a damaging oil spill and the possibility of fire and explosion. In addition, people fear that the NTPC proposal could be an opening wedge of petroleum based industrial development. People opposed to the project generally believe that Port Angeles would suffer the major adverse impacts and would be required to sustain substantial risks while the major benefits from the project would be realized elsewhere.

Onshore Storage Facilities

The vegetation, animal habitat, soils, drainage, and topography of the onshore storage facility site at Green Point would all be affected for the life of the project and in some cases longer. These impacts would be substantial to the site itself, but they would not affect any prime habitat or critical land uses. The impacts would be similar to those resulting from logging or other commercial, industrial, or residential development in the area.

RENDERING OF PROPOSED WEDGE CUT IN BLUFF AT GREEN POINT

An unusual impact would result from excavation of the notch in the bluff at Green Point. This notch would be used during installation of the submarine pipelines and as a ramp on which the pipelines would run from the shoreline up to the storage facility site. The notch scar would be a permanent topographic and visual impact because the bluff could not practically be backfilled to its original contours. Disruption of the natural processes of erosion on the bluff could affect the present rates of siltation and deposition on Dungeness Spit, about 5 miles east of Green Point. During operation of the onshore storage facilities there would be substantial impact on visual and aesthetic values. The change from fairly dense second-growth forest to an industrial facility with 56-foot high tanks and a notch in the bluff would be visually evident for the life of



the project. Hydrocarbon emissions from the crude oil stored in the tanks would probably be noticeable; however, it appears that no air quality standards would be exceeded.

Significant amounts of electrical power would be required to operate the facilities at Ediz Hook and Green Point. The demand for power would be a substantial impact on existing and future electrical facilities and supply. Utility companies are concerned about not having the power available to meet the NTPC requirements. NTPC is exploring a variety of sources and means of providing adequate power to the Port Angeles area, but no solution to this potential problem has yet been identified.

Oil Spill Risks. Impacts from oil leaks at the onshore storage facility would not be expected to be particularly serious. The estimated frequencies of storage tank spills of various magnitudes are shown in table 5. Relatively small operational leaks from tanks and piping would occur frequently. Spilled oil would be confined and cleaned up as part of routine operating procedures. A major spill from a tank would probably not occur during the lifetime of the project. If one did occur it would probably be contained on the site and cleaned up with equipment available at the facility. Fires would not be expected during the lifetime of the project.

Pipeline System

The major direct benefits resulting from the construction and operation of the pipeline system would be economic. During construction there would be direct and indirect benefits from constructin worker's payrolls. During operation there would be continuing tax benefits to counties crossed by the pipeline.

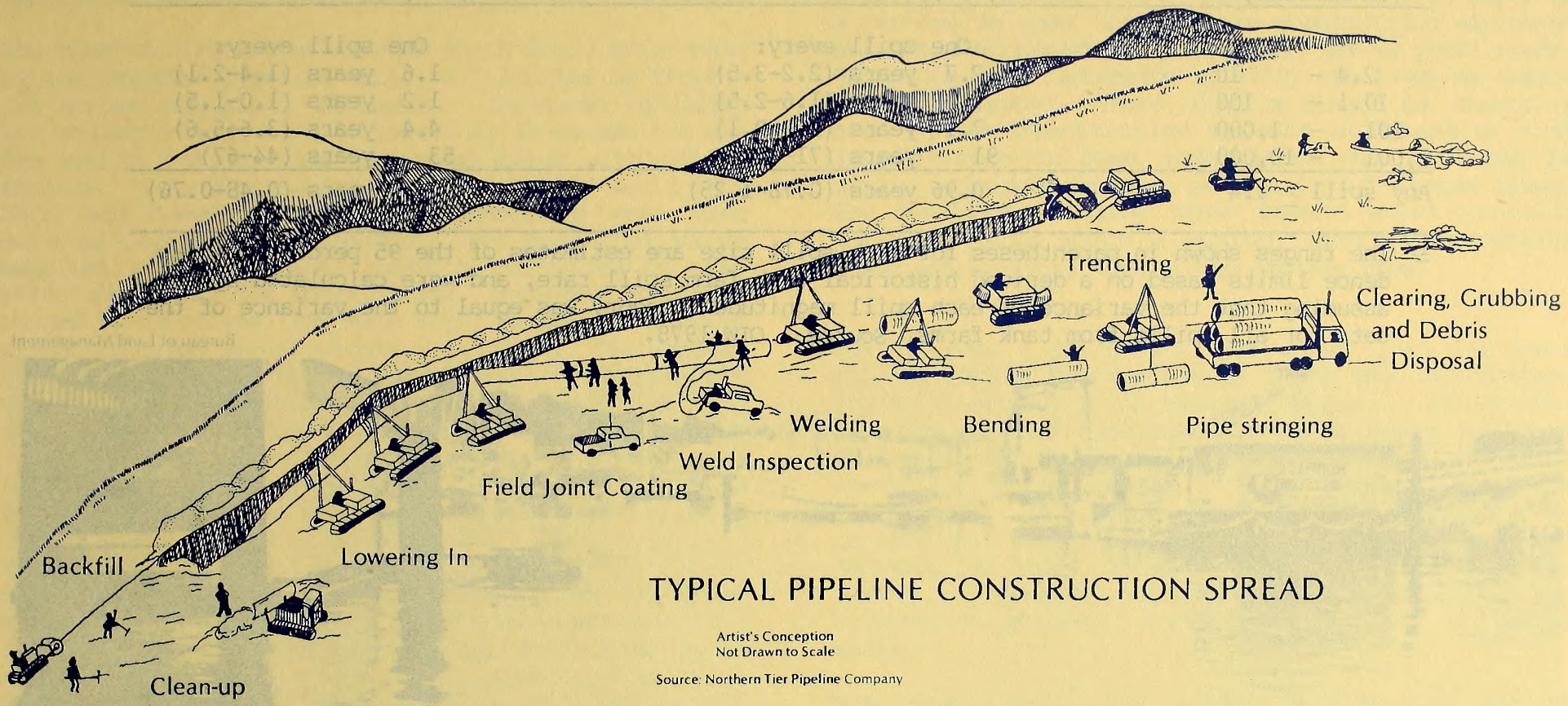
The construction and operation phases of the proposed project would have distinctly different sets of potential impacts along the pipeline corridor. Disruptive impacts to various environmental elements would take place during the construction period. The most significant potential adverse impacts during operation would be related to the risk of oil spills or pipeline leaks.

Construction Phase

The installation of the pipeline would cause only incidential, if any, changes in landform topography along most of the proposed corridor. However, in some short segments of mountainous terrain there may be permanent alteration of topography as a result of the excavation and blasting which may be required to obtain adequate space for construction equipment and installation of the pipeline. Such alterations would affect stability and erosion potential and would have visual and aesthetic impacts.

Soils and vegetation along the pipeline route would be affected by right-of-way clearing, trench excavation and soil compaction by construction equipment. Increased soil erosion by wind and water would be a problem for the length of time it requires to reestablish protective vegetation cover on the backfilled trench and other disturbed areas. Long-term impacts to productivity of agricultural soils would be minimized by segregation and replacement of topsoil over the trench. Some segments of the pipeline corridor might require extraordinary measures in order to reestablish vegetation.

During construction terrestrial animals and birds would be displaced from the corridor and adjacent areas. The pipeline would cross some areas of sensitive habitat,



TYPICAL PIPELINE CONSTRUCTION SPREAD

Artist's Conception
Not Drawn to Scale

Source: Northern Tier Pipeline Company

TABLE 5

ESTIMATED FREQUENCY OF OIL SPILLS AT THE ONSHORE STORAGE FACILITY
(for throughputs of 709,000 bpd and 933,000 bpd)

Spill Magnitude (in barrels)	Spill Frequency and Uncertainty[1/]	
	5,995,000 barrels stored	9,810,000 barrels stored
	One spill every:	One spill every:
2.4 - 10	2.7 years (2.2-3.5)	1.6 years (1.4-2.1)
10.1 - 100	2.0 years (1.6-2.5)	1.2 years (1.0-1.5)
101 - 1,000	7.1 years (5.9-9.1)	4.4 years (3.6-5.6)
1,001 - 10,000	91 years (71-111)	53 years (44-67)
Any spill $\geq$ 2.4	0.96 years (0.78-1.25)	0.59 years (0.48-0.76)

[1/] The ranges shown in parentheses for each spill size are estimates of the 95 percent confidence limits based on a derived historical tank farm spill rate, and were calculated by assuming that the variance of each spill magnitude category was equal to the variance of the data for all spills from tank farms. Source: OIW 1978.

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but it is not anticipated that there would be critical impacts on any species.

The water quality and marine resources of Hood Canal in Washington could be affected by increased sedimentation resulting from runoff and erosion from construction areas parallel to the Canal. Resulting impacts would probably be minor and of short duration.

The numerous freshwater streams which would be crossed by the proposed pipeline would be disturbed by trenching across streambeds and banks. Increased turbidity and sedimentation would be caused by in-stream trenching and by runoff from excavated areas adjacent to streams. This degradation of water quality would have local and downstream effects on beneficial water uses such as fisheries, irrigation, and municipal water supplies. These impacts could be minimized by construction during low water flows. Increased turbidity caused by in-stream trenching would probably return to preconstruction levels within a few days. The impacts of increased sedimentation on fishery resources would generally persist until the next occurrence of high water flows. If salmon spawning areas in streams in the western portion of the pipeline corridor were severely affected by sediment, it could take up to 20 years to regain present productivity levels.

Prehistoric archaeological sites, historic sites, structures and trails, and paleontological resources exist at various places along the pipeline corridor. All ground disturbing construction activities would create the potential for adverse impacts on cultural resources. Intensive cultural resources field surveys prior to construction and monitoring of construction by archaeologists would generally result in site identification prior to disturbance. Adequate provisions for site avoidance if possible and for data recovery from sites which cannot be avoided would be required. These measures should minimize resource destruction and insure the recovery of information from sites which are impossible to avoid.

During construction there would be a variety of local, minor impacts of short duration. Air quality would be degraded by equipment exhaust and dust. Noise could be a nuisance in some areas. Traffic congestion could be a problem in some places where construction equipment and construction workers make heavy use of local roads. Access to some recreation activity areas may be temporarily disrupted. There would be demand for temporary housing for construction workers in excess of what is available in some communities and there may be strain on public services and facilities in some areas. The conditions causing these impacts would generally last for only about 2 months, until construction crews and activity moved on to another area.

The proposed pipeline corridor would cross the Coeur d'Alene Indian Reservation in Idaho and the Flathead Indian Reservation in western Montana. The Tribal Council of the Confederated Salish and Kootenai Tribes of the Flathead Reservation has stated firm opposition to having the proposed pipeline cross the reservation. The effect of this decision would be to require some alternative pipeline route in a portion of Montana. At this time NTPC has not selected an alternative to the proposed route which would avoid the reservation although several alternatives are being analyzed.

The impacts from construction of pump stations and transfer and delivery facilities would be localized and of longer duration than those associated with pipeline construction. Except for duration, the impacts from these construction activities would be comparable to those discussed in the preceding paragraphs.

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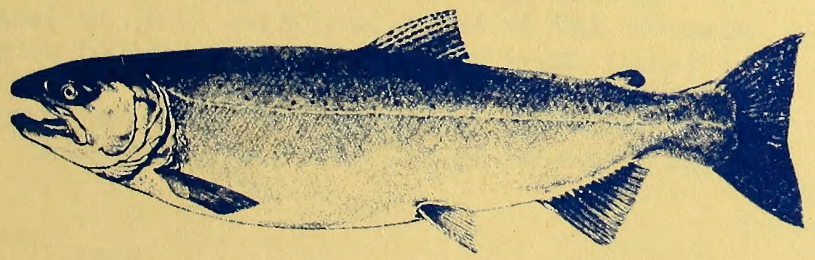
SILVER (COHO) SALMON

Oncorhynchus kisutch (Walbaum, 1792)

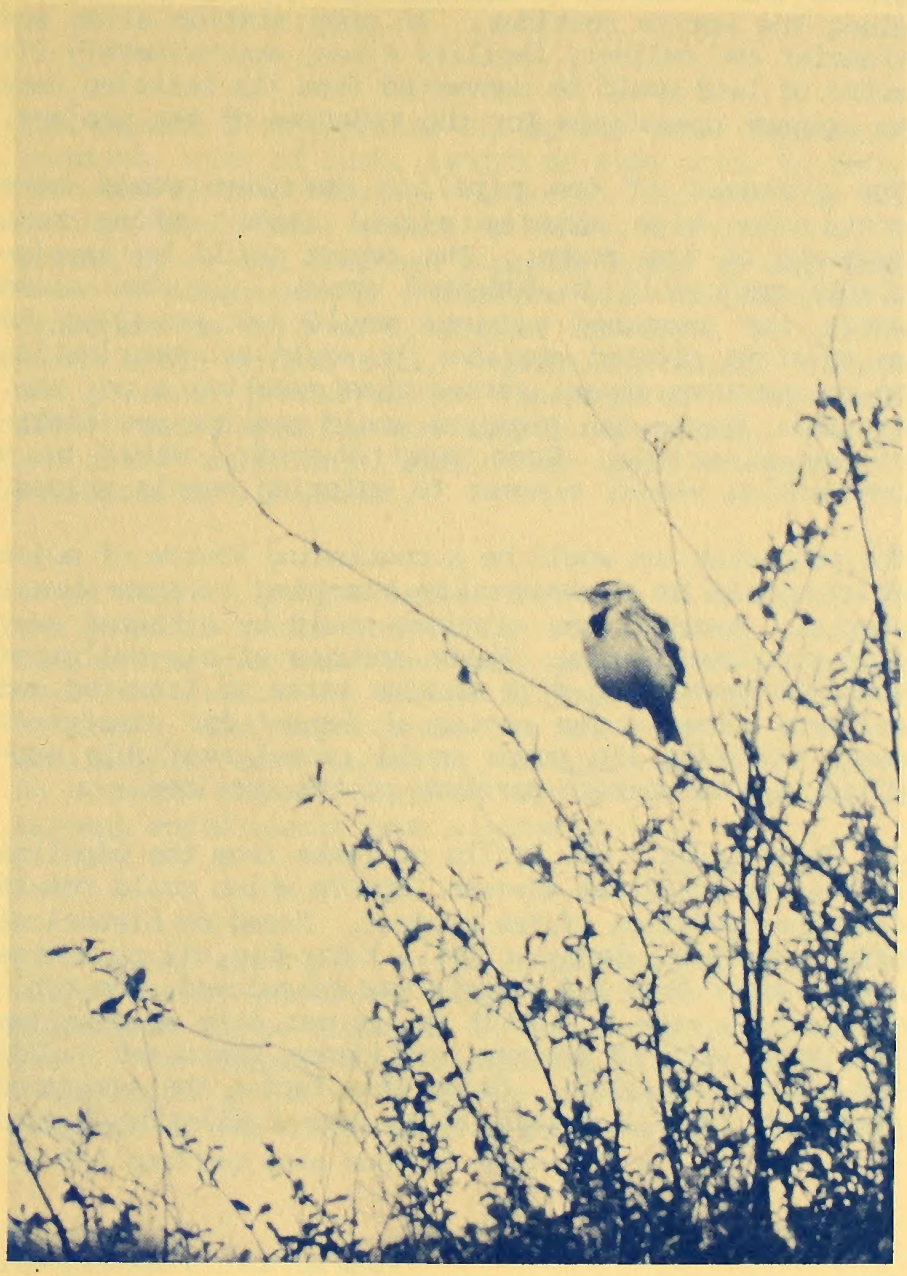


Following completion of construction of the pipeline system there would be a period for testing the facilities. The hydrostatic testing of the pipeline would require withdrawal of water from local sources, usually conveniently located streams, and discharge of test water following the tests. Some impacts affecting fish and other organisms, the physical characteristics of the banks and bed of the streams, water flow and water quality would result from both withdrawal and discharge. Regulations affecting time of year, rates of intake into the pipe, discharge of water from the pipe, and treatment of water prior to discharge into streams would minimize the impacts, if required and implemented.

Operation Phase

There would be several different kinds of impacts associated with operation of the proposed pipeline system. The most noticeable impact would be the commitment of a 75-foot wide corridor, approximately 1,557 miles long, to the specific purpose of crude oil transportation. While some natural processes and human activities would continue as if the pipeline were not there, other processes and activities would be prevented for the lifetime of the project. In addition, the presence of the pipeline corridor may attract other similar uses along all, or more likely, parts, of the route. This could lead to impacts lasting longer than the lifetime of the project.

Geological hazards such as surface-fault rupture, ground shaking, liquefaction, and slope instability all represent potential problems at several locations along the pipeline corridor. In no case is a damaging event considered likely; however, an occurrence resulting in a pipeline rupture would have multiple environmental effects.



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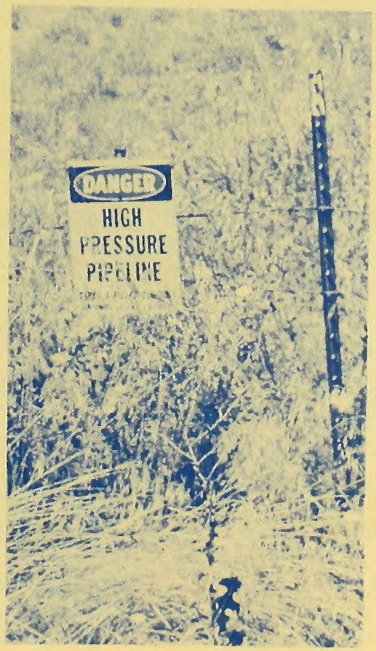
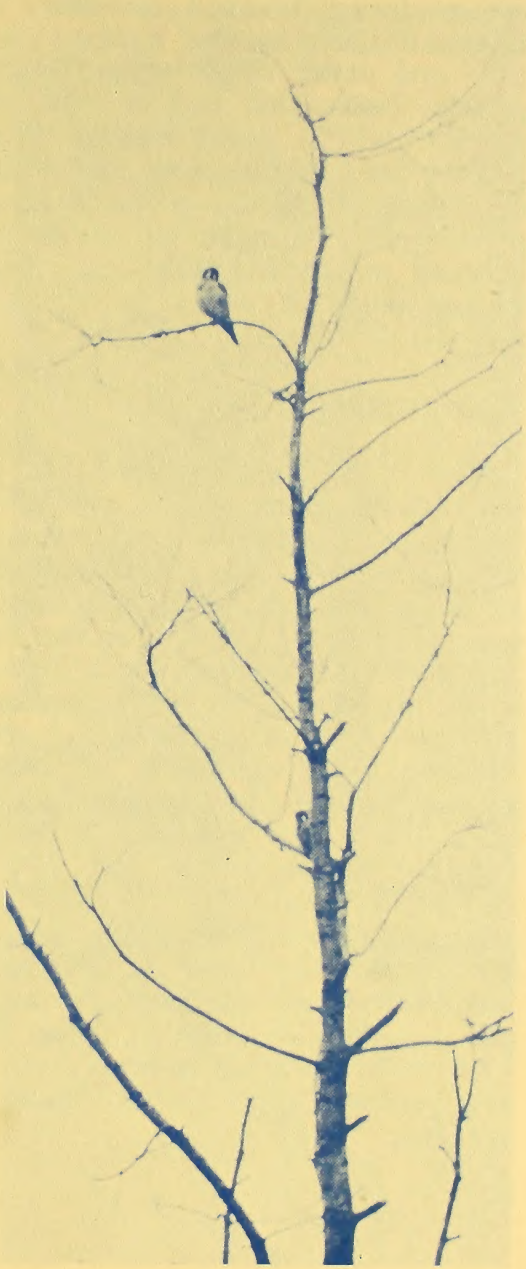
Along substantial lengths of the proposed corridor current vegetation and land uses could be reestablished following construction of the pipeline. However, tree growth and building construction would be prohibited along the entire corridor. At pump station sites and transfer and delivery facility sites, approximately 275 acres of land would be converted from its existing uses to project operations for the lifetime of the project.

The presence of the pipeline corridor would have continuing high adverse visual impact along some segments of the route. The impact would be particularly noticeable in forested areas. In some areas where the proposed project would run parallel to an existing cleared corridor it would be contributing to an existing impact rather than creating a new one. In other places the pipeline would require new right-of-way clearing. Each pump station would be a contrasting visual element to existing scenic values.

The pump stations would be a continuing source of noise which could be occasionally annoying to some local people. However, the stations would be situated away from populated areas. Minor amounts of air pollution would be associated with storage tanks at transfer and delivery sites. The continual demand for electrical power to drive the pumps could exceed available supplies in some western portions of the corridor.

Oil Spill Risks. Oil spills or leaks from the pipeline system are potential adverse impacts which could result from the operation of the project. Based on historical pipeline spill data, a spill rate for oil pipeline leaks larger than 2.4 barrels was calculated. The estimated spill rate is 0.0022 spills per mile of pipeline per year, with 95 percent confidence limits of 0.0002 and 0.0046 (OIW 1978). Using this factor the estimated frequency of oil spills along the 1,557-mile length





Photos from Bureau of Land Management

Impacts from Increasing Capacity to Serve Puget Sound Refineries

The expansion of facilities to supply approximately 350,000 bpd to the four refineries on the east side of Puget Sound is not a part of the project as proposed by NTPC. However, in anticipation of the possibility that NTPC might be required to increase capacity, the system is designed to be expanded without major reconstruction or disruption of operations. The major impacts from such an expansion would take place in Puget Sound and the Strait of Juan de Fuca and at Port Angeles and the Green Point onshore storage facility. The increased throughput would require additional pump stations and more power to the pumps in the original design, but no new pipeline construction would be required from Green Point to North Bend, Washington.

The third tanker unloading berth and the third submarine pipeline would require additional land on Ediz Hook and would commit additional harbor area to tanker operations and restricted anchorage zones. In addition, the increase in tanker traffic by nearly 30 percent would mean more vessel traffic congestion and more time during which restrictions on and disruptions of current uses would occur.

Elimination of crude oil tanker traffic east of Port Angeles would have a beneficial impact by reducing the risk of crude oil spills in those sensitive marine waters. However, there would be a consequent increase in oil-spill risk in the Strait of Juan de Fuca and Port Angeles harbor. A potentially adverse impact could result from possible higher costs which the Puget Sound refineries would pay for crude oil supplied by pipeline in comparison with the prices of tanker supplied crude. Consumers of refined products as well as refinery owners would be affected.

of the pipeline would be approximately 3.4 spills per year. The FES will include additional detail on pipeline spill risk and estimated frequencies of spills of various magnitudes.

The impacts from pipeline oil spills would depend upon location, size of leak, length of time prior to detection and cleanup efforts. Leaks on land would be less serious than those affecting water. Because of the proximity of the proposed pipeline route to Hood Canal there is potential for a pipeline leak to affect marine resources as well as freshwater streams. Terrestrial leaks could affect soil, vegetation, animal habitat, and possibly ground water. Leaks into streams would affect water quality and aquatic organisms. Fishing and other recreational activities could be temporarily disrupted by oil spills.

Large scale pipeline leaks resulting from rupture of the pipeline would not likely occur during the lifetime of the project. The total quantity of oil spilled would be limited by automatic detection and shut-off systems. The impacts to the environment would be similar, but more extensive, to those mentioned above. An economic impact based on the costs of damages and cleanup would result from a large spill.

NTPC would establish a Spill Contingency Plan which would assign personnel responsibilities and outline procedures to be followed in the event of a pipeline leak. The company's participation in the Clean Sound Cooperative would be a factor involved in emergency response to and clean up of a pipeline spill resulting in oil getting into coastal waters.

The onshore storage facility at Green Point would not have to be expanded beyond the original 294 acres, but additional acreage on the site would be converted from natural vegetation to project purposes. It is also likely that the notch in the bluff at Green Point would have to be reopened and expanded to accommodate the trench for the third submarine pipeline carrying oil across the harbor from the tanker unloading berths.

Alternatives to the Proposed Action

A number of alternatives to all or parts of the NTPC proposal were considered. The basic purpose of the proposal, "to provide a means of transporting Alaskan and foreign crude oil from the West Coast to the Northern Tier and inland states," was used as the criterion to identify realistic alternatives. The two primary objectives of the proposed crude oil transportation system would be: 1) to provide a dependable supply of crude oil to the Northern Tier and other inland states, and, 2) to provide an improved means of transporting Alaskan crude oil from the West Coast, where supply exceeds demand, to markets where it is needed.

A number of independent proposals for crude oil transportation systems could accomplish all or part of the objectives of the NTPC proposal. These total system alternatives, as well as several port site and route segment alternatives for the NTPC proposal, have been evaluated. Considerations of no action and delayed action have also been included. The summary of alternatives which follows is divided into four parts: no action/delayed action, ports and onshore storage facilities, pipeline route segments, and complete systems.

No Action/Delayed Action

The no action alternative would occur if the Secretary of the Interior decided to deny the NTPC application for a right-of-way permit. In evaluating this alternative, it has been assumed that, as a consequence of this decision, a port and crude oil transportation system as proposed by the applicant would not be built. As a result of no action, the adverse environmental impacts from construction and operation of the proposed system would all be avoided. Similarly, the economic benefits from employment and tax payments would not be realized.

The crude oil shortage at some refineries could continue or increase, leading to reduction in refinery production, fewer jobs and higher prices for refined products. A continuing shortage of adequate crude oil supplies at economical prices could also encourage the initiation of other transportation system proposals to meet the refinery and market demands in the Northern Tier states.

The no action alternative assumes the delivery of excess Alaskan crude oil to the West Coast would continue or increase. If economical transportation systems are not available the production in Alaskan oil fields could be reduced, causing adverse economic impacts to the oil companies, the state government of Alaska, and the general work force.

The delayed action alternative would result from a delay in the decision on the NTPC application for a federal right-of-way permit. The delay could be for an indeterminate length of time, but not for so long as to constitute no action. During the delayed action period the environmental impacts would be similar to those discussed for no action. Alaskan crude oil in excess of West Coast needs would probably continue to be

transported by tanker through the Panama Canal. The actions of developers of independent alternative proposals could be delayed, accelerated or unaffected.

Ports and Onshore Storage Facilities

Alternative ports and onshore storage facilities were evaluated with the assumption that throughput and storage capacity would be the same as proposed by NTPC. Figure 8 shows the locations of the alternative port sites, and the onshore storage facility site which was evaluated as an alternative to the Green Point site for the marine terminal in Port Angeles Harbor. Of five alternative port sites which were initially considered, one, at Discovery Bay, was eliminated from detailed evaluation and is not discussed below. For each alternative port and onshore storage facility site, a pipeline segment which would connect the alternative location to the pipeline route proposed by NTPC has also been considered. Table 6 presents a comparison of the potential environmental impacts for the port alternatives.

Cherry Point. At Cherry Point there are two existing refineries with associated tanker berths and storage facilities. Use of this alternative site would require two additional berths, increased onshore storage and a 117-mile pipeline to the vicinity of North Bend, Washington. Environmental impacts in this area which is already being used for crude oil transshipment would be less significant than in a relatively less developed area. The risks of oil spills would be increased but not introduced. Construction impacts along the pipeline right-of-way would be minor, local, and generally of short duration.

Construction or expansion of crude oil tanker unloading facilities at Cherry Point is prohibited by the Marine Mammal Protection Act of 1972 as amended in 1977. This site could be a viable alternative only if the Act would be amended, deleting the prohibition.

Burrows Bay. The Burrows Bay alternative would require construction of a sea island-type berth, submarine pipelines to storage tanks built onshore and a 91-mile pipeline to the vicinity of North Bend, Washington. Environmental impacts would be significant because of negligible current industrial development in the area and the presence of important marine and terrestrial resources. Oil-spill risks would represent a new potential for environmental impacts in the area. Along the pipeline right-of-way there would probably be only minor local impacts of short duration.

Construction of a crude oil transportation facility at Burrows Bay is prohibited by the Marine Mammal Protection Act of 1972, as amended in 1977. This site also could not be a possible alternative unless the legislation is changed.

Freshwater Bay. This alternative would require construction of a single point mooring system, submarine pipelines to shore, onshore storage facilities and 17 miles of pipeline to reach the proposed pipeline route south of Green Point. The impacts from construction of the terminal facilities would be significant because there is relatively little development in the area at this time. Impacts related to the pipeline segment would probaly be minor, local and temporary. Preliminary oil-spill risk and spill trajectory analyses indicate that marine oil spills at this port site would oscillate within the Bay, rather than spreading to the extent determined for other spill sites in the Strait of Juan de Fuca.

Low Point. NTPC selected this site as its primary alternative port site. It would require two single point moorings, submarine pipelines to shore, and

TABLE 6 COMPARISON OF ENVIRONMENTAL IMPACTS FOR THE PORT ALTERNATIVES TO THE PROPOSED PORT ANGELES PORT

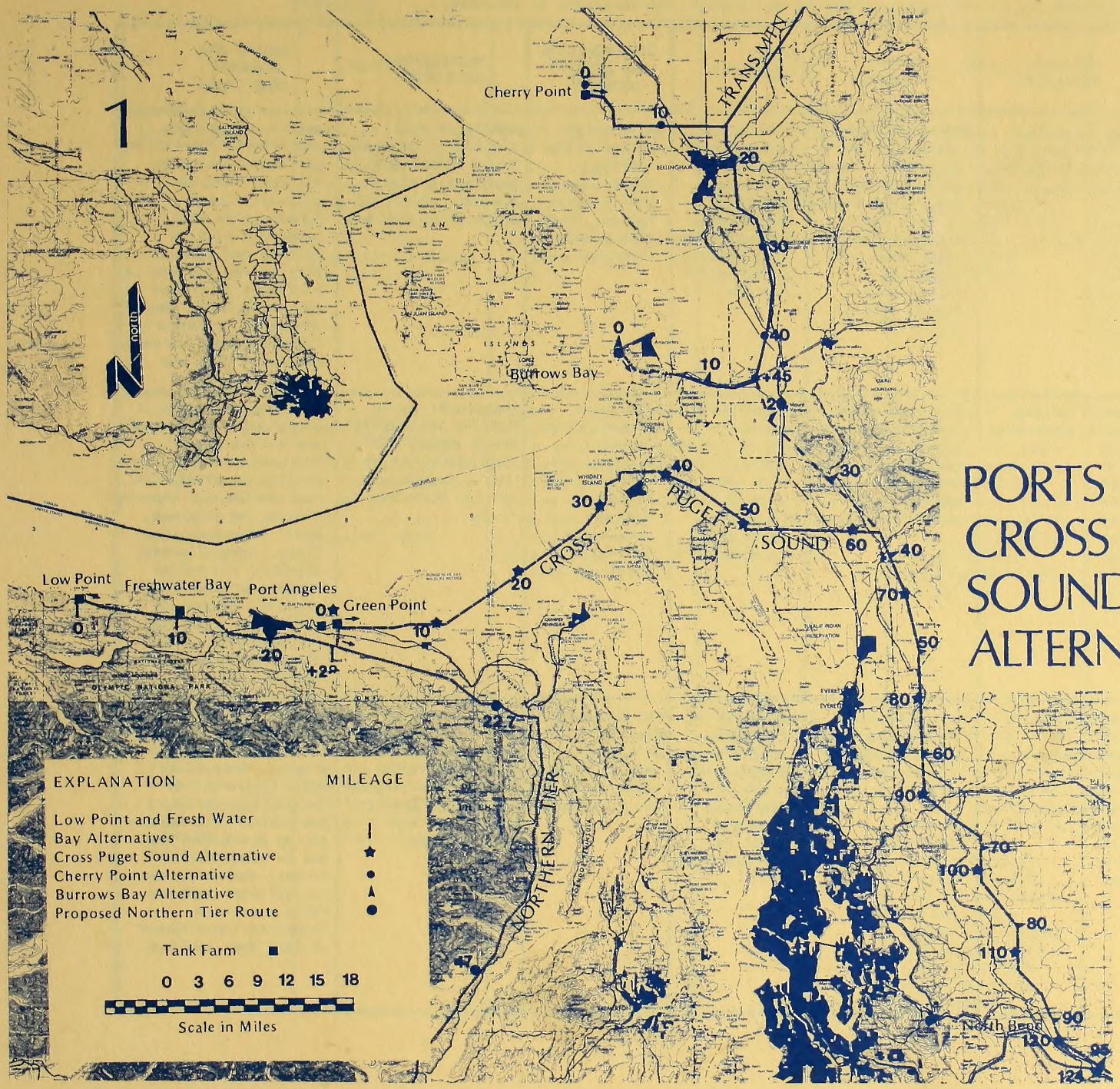
	DESCRIPTION	AIR QUALITY NOISE	TOPOGRAPHY GEOLOGY	SOILS	AQUATIC RESOURCES	MARINE RESOURCES
PROPOSAL Port Angeles	Construct berth facilities on Ediz Hook, submerge pipeline to Green Pt., onshore storage facilities and pump station at mi 0. Construct 195 mi of pipeline to North Bend.	Increased SO_2 and NO_x concentrations. SO_2 would exceed the Class I for Olympic Nat'l Park about 3-4 days/yr. High construction noise levels at Ediz Hook and Green Pt. Night noise standards exceeded during construction. Operation noise increase at Ediz Hook, Green Pt., and at pump stations along pipeline.	About 140 ac graded at storage site, 2-3 ac for launchway ramp 12-15 ac/mi for pipeline. Pipeline near 1 active fault. Potential slope failure and/or liquefaction problem at tanker unloading berth and along pipeline. Potential outburst flood impact along pipeline.	Loss of soil productivity on 140 ac at tank farm, 2,220 ac along pipeline. Soil loss of 2-50 t/ac/yr from construction and 0.36 t/ac/yr during operations. About 3 t/d soil lost from dust during construction. About 1,100 ac wet soils compacted with 5% temporary loss of productivity.	Sediment and potential oil spill impact to 18 major rivers and several localized high aquifer zones. 40 migratory fish streams crossed. Sedimentation of salmon and trout spawning areas. Potential oil-spill impacts to downstream fish populations.	Laying of submarine pipeline would degrade water quality in harbor. Small, frequent, at berth oil spills would taint marine resources. Major oil spill in harbor would cause high mortality to water fowl, as far reaching as Dungeness Spit. Sports and commercial fisheries impacted.
Cherry Point	Construct 2 new berths at existing terminal, submarine pipelines to onshore storage facilities, storage tank farm, and 117 mi of 42-in pipeline to North Bend. Project illegal under Marine Mammal Protection Act.	Air pollutants from 2 additional tanker berths and additional tank storage. Increase in SO_2 and NO_x concentrations. Increase in noise at tank farm.	About 140 ac graded at storage site and 15-20 ac/mi on pipeline. Seismic Risk Zone 3. No known active faults. Potential slope failure problems on pipeline. Potential damage to berths from failure of unstable bluffs.	Loss of soil productivity on 140 ac at storage site and 1,275 ac on pipeline. Water erosion loss less than 5 t/ac/yr on storage site and less than 15 t/ac/yr on pipeline route.	9 major stream crossings; sediment impacts; potential spills to 4 major urban water supplies. 30 migratory fish streams impacted. 30% reduction of crossings, fish production twice that of the proposal.	No major construction impact. Oil spill could severely impact resources in area and into Canada.

TERRESTRIAL VEGETATION	TERRESTRIAL WILDLIFE	CULTURAL RESOURCES	VISUAL RESOURCES	LAND USE	TRANSPORATION AND UTILITY NETWORKS	RECREATION RESOURCES	SOCIAL AND ECONOMIC CONDITIONS
Most of the 294-ac facility would be cleared of forest vegetation during construction and maintained treeless during operation. About 1,147 ac would be cleared of forest vegetation and 1,141 ac maintained treeless along the pipeline.	Loss of 294 ac of wildlife habitat. Disturbance of wintering bald eagles on Green Pt. site. Potential oil-spill impacts on wildlife. Along the pipeline near Dabob Bay and the Nisqually R., potential impact to bald eagle habitat.	Indirect impacts on historic sites in Port Angeles. Potential impacts on 5 prehistoric archeological, 11 historic, and 3 paleontological sites along the pipeline.	During construction high impact at Ediz Hook and tank farm. During operation low impact at Ediz Hook, moderate to high at tank farm. Pipeline section VRM Class II and III. Construction phase impact high. During operations impact low to moderate.	Major impacts on log storage, pilot station, boat marina and ramp. Nuisance impacts to urban land uses at Port Angeles and at numerous locations along the pipeline. Disrupt drainage tiles on some agricultural land.	Summer traffic congestion during construction phase. Relocation of VOR site, navigation aids, impact on Coast Guard air station. Increased electric power load.	Loss of 2 boat launch facilities, but committment to replace. Degradation and disruption of recreational activities. Potential boat conflict with tanker lane. Tanker oil spill would severely impact marine related recreation for Port Angeles and Puget Sound shorelines.	Construction- population increase, housing strains, increased demands on services. Increase in personal income and employment. Possible hostility towards project personnel. Operation - increased property tax revenues. Perceived decline in quality of life and enjoyment of area in Clallam County.
140-ac forest area lost and 300 ac on pipeline plus 70 riparian. No endangered species.	Loss of 1,275 ac of wildlife environment on pipeline and 140 ac on storage site. Potential oil-spill impact on wildlife. Potential trumpeter swan habitat.	High potential for 21 known sites on pipeline.	Moderate impacts during construction and moderate to low during operation at terminal and along the 117-mi pipeline.	Would affect less forest land than proposed route. Major oil spill could impact Lummi Indian Reser. beaches. Similar impacts to urban and agricultural lands.	42% increase in tankers. Requires 20-25 MW less power than proposed route. More navigational risk than proposal.	Effects of tanker spill would be similar to proposal although affecting a different and smaller geographic area. Could affect Canadian shorelines.	Lower construction cost, reduced strain on housing and community services, and smaller increases in income and employment. Small increase in property tax revenues. Greater risk of marine oil spill and greater damage potential.

TALBE 6 COMPARISON OF ENVIRONMENTAL IMPACTS FOR THE PORT ALTERNATIVES TO THE PROPOSED PORT ANGELES PORT

	DESCRIPTION	AIR QUALITY NOISE	TOPOGRAPHY GEOLOGY	SOILS	AQUATIC RESOURCES	MARINE RESOURCES
Burrows Bay	Construct sea island tanker berth, submarine pipeline to storage, and 91 mi of 42-in pipeline to North Bend. Project illegal under Marine Mammal Protection Act.	Slight increase in SO_2 and NO_x concentrations. Temporary daytime increase of noise during construction, slight increase over ambient noise from pump motors.	About 140 ac graded at storage site, plus 15-20 ac/mi along 91-mi pipeline. Seismic Risk Zone 3. No known active faults.	Loss of soil productivity on 140 ac at storage site and on 91 mi of pipeline. Erosion losses of 2-15 t/ac/yr after construction and 1.0 t/ac/yr after revegetation.	7 major stream crossings; sediment impacts; potential spills to 3 major urban water supplies. 18 important migratory fish streams crossed. Twice the fish production of proposal, but 60% reduction of stream crossings.	Degradation of water quality during construction of submarine pipelines Marine oil spill would affect San Juan Islands, Whidbey Island and others. Pipeline would degrade water quality in Burrows Bay.
Freshwater Bay (Described impacts of the 17-mi pipeline to Green Pt. are in addition to the proposed 195 mi pipeline to North Bend)	About 6 mi W of Port Angeles 2-3 SPMs 10,000 ft. offshore. Submarine pipelines to tank storage on shore. 17 mi of 42-in pipeline to Green Pt. area.	Class I standards for SO_2 in Olympic Nat'l Park exceeded about 3-4 d/y. Noise impact at onshore site during construction. Pump motor noise during operation a minor impact.	About 140 ac graded at storage site and 12-15 ac/mi on pipeline. Seismic Risk Zone 2. Possible slope failure of coastal bluff during construction.	Loss of soil productivity on 140 ac at storage site and on 17 mi of pipeline. Soil loss from erosion 3-4 t/ac/yr after construction; 0.04 t/ac/yr after revegetation, (storage site and pipeline).	Same as proposed, but 1 additional major stream crossing, 8 streams have migratory salmon and trout. Sedimentation of salmon and trout spawning areas. Potential oil-spill impacts on fish.	Chronic oil spills could degrade waters of bay and adjacent strait. Major oil-spill slick would spread beyond Freshwater and Cresent Bays.
Low Point (Described impacts of the 28-mi pipeline to Green Pt. are in addition to the proposed 195 mi pipeline to North Bend)	2-3 SPMs approx. 2 mi NNW of Low Pt. Submarine pipelines to area SSW of SPMs. Storage tanks, pump station, and 28-mi of 42-in pipeline to Green Pt. area.	Noise impact at onshore site during construction. Pump motor noise during operation a minor impact.	140 ac graded onshore storage site and 12-15 ac/mi on pipeline. Seismic Risk Zone 2. No known active faults.	Loss of soil productivity on 140 ac at storage site and on 28 mi of pipeline. Erosion loss of 0.7 t/ac/yr on storage site and 15 t/ac/yr on pipeline. Reduced to 0.06 t/ac/yr and 2.00 t/ac/yr by revegetation. 2-yr. compaction impact, 10% productivity loss on storage site, and 5% on pipeline.	Same as proposed, but 3 additional major stream crossings. 16 migratory fish streams, sedimentation of salmon and trout spawning areas. Oil-spill impacts on fish.	Chronic oil spills during operation could degrade water quality in Bay and Strait. Major oil spill would affect area including part of Canada, Dungeness Spit, and San Juan Islands.

TERRESTRIAL VEGETATION	TERRESTRIAL WILDLIFE	CULTURAL RESOURCES	VISUAL RESOURCES	LAND USE	TRANSPORATION AND UTILITY NETWORKS	RECREATION RESOURCES	SOCIAL AND ECONOMIC CONDITIONS
140-ac forest land lost at terminal and 296 ac on pipeline. No endangered species.	Approx. 993 ac habitat modified on pipeline. Potential bald eagle and peregrine falcon habitat. Potential oil spill impacts on wildlife.	High potential impact on 22 known sites on pipeline.	Shoreline break in topography where submarine lines go to storage area. High impact to tank farm during construction. Moderate impact of shoreline cut beyond life of project.	Stimulate urban growth in undeveloped area. Pipeline would impact ½ mi of tideland claimed by Swinomish Indians.	More navigational risk, traffic congestion than proposal. Approx. 25 MW less power than proposal.	Impacts of spill similar to proposal. Would affect smaller geographic area, however, closer to large urban centers.	Impacts minimal and short-term. Population increases less significant than for proposal. Lower construction cost, reduced strain on housing and community facilities, and smaller increases in income and employment. Smaller increases in property tax revenues. Increased oil-spill risk and damage potential.
About 200 ac of forest lost on storage area and pipeline at 1,400 bd. ft/ac for 25yrs.	About 200 ac of forest habitat changed to open type. No endangered species. Potential oil-spill impacts on wildlife.	Potential for site discovery.	Shoreline break in topography where submarine lines come ashore. High short-term impact, persisting as moderate to low.	Reduction in productive forest lands. Inconsistent with land use plan. ¼ mi of pipeline would be in Olympic Nat'l Park.	SPMs cause inconvenience to small vessel navigation close to shore. Highway congestion during construction.	Impacts of spill similar to proposal. Could impact shellfish resources on Nat'l Refuge and affect Port Angeles area.	Additional pipeline would increase economic and social impact. Increased construction related population in Clallam County. Impacts similar to proposed. Spill impact on Lower Elwha Indian fishery. Economic and social impacts greater than proposal because of additional pipeline. Increased oil-spill impact on Lower Elwha Indian fishery.
Loss of 150 ac timber production at 10,000 bd. ft./ac on storage site, and 230 ac at 14,000 bd. ft./ac on pipeline.	Temporary dislocation of terrestrial animals during construction. Change of approx. 350 ac of forest habitat to open type. Potential bald eagle habitat. Potential oil-spill impacts on wildlife.	High potential for site discovery. Potential impact to 11 known sites.	Shoreline break in topography where submarine lines come ashore.	Reduction in productive forest lands. Inconsistent with land use plans. ¼ mi of pipeline in Olympic Nat'l Park.	SPMs potential hazard to shipping approx. 25 MW additional power needed.	Impacts of spill similar to proposed proposal. Geographic area affected is larger, including Canadian shorelines and Port Angeles.	Economic and social impact during construction greater than proposal because of added construction related population. Quality of life impacts during operation less due to reduction of visual, aesthetic and recreational impacts. Heavy petroleum industrial development of Ediz Hook avoided.



PORTS AND CROSS PUGET SOUND ALTERNATIVE

Figure 8.

onshore storage facilities. Twenty-seven miles of pipelines and one additional pump station would be required to connect this marine terminal to the proposed pipeline route. Construction and routine operation impacts would probably be similar to those for the Freshwater Bay alternative. However, preliminary trajectory analysis indicates that oil spills in this area could affect the Canadian shore of the Strait of Juan de Fuca and could travel as far east as Dungeness Spit and the San Juan Islands.

Alternative Storage Facility Site 3. NTPC identified this site as its primary alternative onshore storage facility site. Environmental impacts from construction and operation of the facility at this site would be comparable to those which would occur at the proposed site at Green Point. The use of this site for an industrial development would be in conflict with Clallam County's zoning designations and land use plans. Construction of the facility probably would not comply with the Clallam County Shoreline Master Program.

Pipeline Route Segments

Alternative route segments of various lengths have been selected by NTPC in response to environmental, engineering and political problems which have been identified during the development of the project proposal. Figure 9 shows the locations of the various route segments which have been evaluated in the DES. Table 7 presents a summary comparison of the potential environmental impacts of each route segment alternative.

Cross Puget Sound. The cross Sound segment (figure 8) is an alternative to the proposed route along Hood Canal and around the south end of Puget Sound to North Bend, Washington. The alternative route

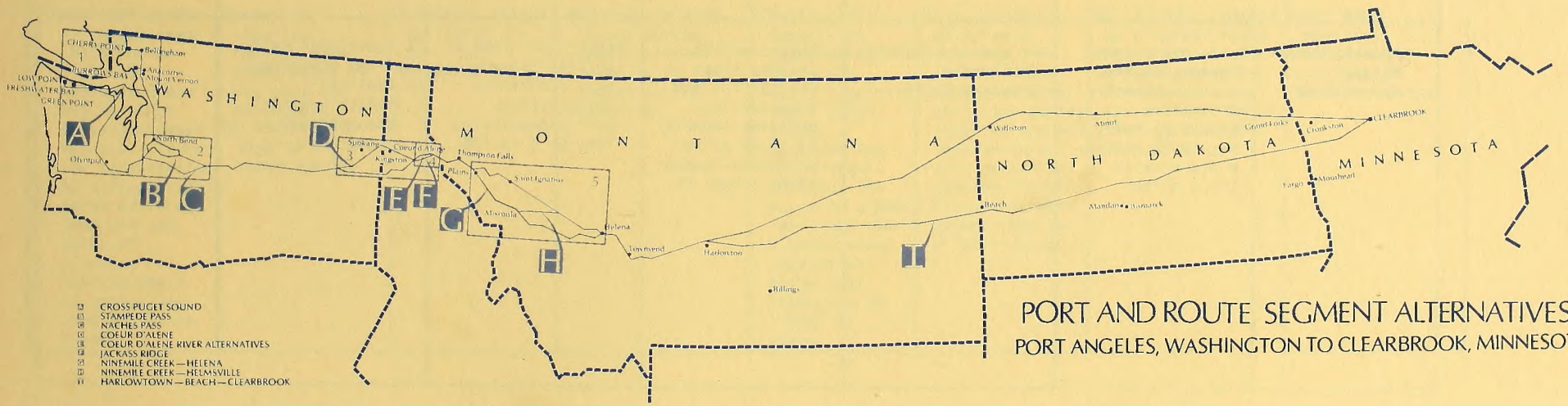


Figure 9.

TABLE 7 OF ENVIRONMENTAL IMPACTS ON THE ROUTE SEGMENT ALTERNATIVES TO THE PROPOSED ROUTE

	DESCRIPTION	AIR QUALITY NOISE	TOPOGRAPHY GEOLOGY	SOILS	AQUATIC RESOURCES	MARINE RESOURCES
MONTANA Plains-Helmville Proposed Route (across Flathead Indian Reservation)	Proposed route starts at Plains, pm 548, east across Flathead Indian Res., southeast to Helmville at pm 660 distance of 112 miles.	Minor air quality impacts at construction site. Local noise due to construction. Increased noise in vicinity of pump stations.	Landscape changes 15-35 acres/mile In Seismic Risk Zone 2, moderate damage expected. No known active faults. Potential slope instability problems.	About 370 acres has potential for water erosion of about 20 T/AC/YR after construction; about 850 acres has low potential of 2 T/AC/YR; reducing to 2 T/AC/YR and 0.9 T/AC/YR by revegetation.	Numerous major stream crossings; sediment impacts Fisheries: sedimentation of trout spawning areas. Potential oil spill impacts on downstream fish populations.	None
Ninemile Creek-Helena Alternative	Route starts near Plains, pm 548, follows Ninemile Cr east to Missoula, I-90, Hwy 12 to Helena, a distance of 167.5 miles.	Air quality impacts similar to proposed route.	Crosses active faults, slope instability and liquefaction problems. Impacts of 15-35 acres/mile disturbance along Siegel Cr.	Annual soil loss of 16 T/AC/YR reducing to 1 T/AC/YR by revegetation. Soil productivity loss of 1 to 10%.	4 additional major stream crossings; Fisheries: impacts greater than proposed route.	None

TERRESTRIAL VEGETATION	TERRESTRIAL WILDLIFE	CULTURAL RESOURCES	VISUAL RESOURCES	LAND USE	TRANSPORTATION AND UTILITY NETWORKS	RECREATION RESOURCES	SOCIAL AND ECONOMIC CONDITIONS
Cleared land: 906 acres forest 383 acres grassland 196 acres riparian Maintained land: 772 acres forest 180 acres riparian No endangered species.	Potential peregrine falcon nesting and wintering habitat along Clark Fork R. Potential bald eagle nesting and wintering habitat along Clark Fork , Flathead R and Placid Lake. Active nests along Clearwater and Blackfoot R. Loss of wildlife habitat along Flathead R.	Potential impact on 29 prehistoric archeological sites and 4 historical sites. Potential impacts unrecorded cultural resources.	Moderate to high impaet during construction for recreationists access to Lake Placid and Martinsdale Reservoir moderate to low for long term operation.	Construction impacts on 1,380 acres. Operation would require about 1,040 acres. Crosses about 60 miles of the Flathead Indian Res.	Utilizes about 58 miles of existing corridors. Possible conflicts with future expansion or D C operation of a transmission line.	Impacts on big game hunting and fishing on Flathead, Jocko, Clearwater, and Blackfoot Rivers. Loss of visual and recreational qualities along Blackfoot River. Increases in ORV use which may affect other recreationists.	Population increase on personal income and employment. Strain on housing and community facilities.
About 467 acres of forest land, 154 acres of riparian vegetation and 819 acres of grassland-range would be cleared for construction An estimated 412 acres of forest land and 128 acres of riparian habitat would be maintained free of mature trees.	Forest and riparian habitat loss. Disturbance of big game and waterfowl. No known threatened or endangered species	Potential impact on listed cultural resource sites.	Moderate to high impact during construction reducing to low impact during operation.	Construction impacts on 2,060 acres. Operation would require about 1,550 acres. Construction would cause nuisance impacts to urban land uses near Missoula. Poss. impacts to wilderness resources on 2 RARE II areas.	Utilizes about 95 miles of existing corridors. Poss. damage to other utilities during construction and interference with future expansion. Traffic disruption more severe than for primary route.	Not as many impacts as proposed route. Major concern for crossing proposed wilderness areas and degradation of fishing in Clark Fork River.	Short term impacts on housing and services in Granite County.

TABLE 7 COMPARISON OF ENVIRONMENTAL IMPACTS ON THE ROUTE SEGMENT ALTERNATIVES TO THE PROPOSED ROUTE

	DESCRIPTION	AIR QUALITY NOISE	TOPOGRAPHY GEOLOGY	SOILS	AQUATIC RESOURCES	MARINE RESOURCES
Ninemile Creek-Helmville Alternative	Route starts near Plains, pm 548, follows Ninemile Cr east to Missoula, along Hwy 200 west to Helmville, a distance of 117 miles.	Air quality impacts similar to proposed route.	Minor landscape changes. Slope instability disturbance of 15-35 acres/mile along Siegel Mtn. No known active faults.	Erosion and productivity loss similar to above alternative. Additional adverse soil impacts from water erosion from Missoula to Helmville in steep mountain terrain. 15-20 T/AC/YR	9 additional major stream crossings; Fisheries: Impacts greater than proposed route.	None
IV NORTH DAKOTA - MINNESOTA Harlowton-Minot-Clearbrook Proposed Route (Portal Pipeline)	Route starts near Harlowton,MT pm 840, eastward past Dickenson and Minot,ND,near Grand Forks, ending at Clearbrook,MN A distance of 687 miles.	Minor air quality impacts at construction site. Local noise due to construction. Increased noise in vicinity of pump stations.	Minor landscape and drainage changes. In Seismic Risk Zone 1, minor earthquake damage expected. No known active faults. No identified geologic hazards.	2,500 acres susceptible to water erosion from 21 T/AC/YR reducing to 1.1 T/AC/YR by revegetation. 2,100 acres susceptible to wind erosion at 45-200 T/AC/YR reducing to 4 T/AC/YR by revegetation.	17 major stream crossings; sediment impacts; numerous seasonably high water tables and urban water supplies. Fisheries: Potential oil spill impacts on downstream fish populations.	None
Harlowton-Beach-Clearbrook Alternative	Route starts near pm 840,Harlowton, MT, eastward past Beach and Bismarck ND, north of Fargo ending at Clearbrook,MN, a distance of 692 miles.	Air quality impacts similar to proposed route.	Minor landscape and drainage changes. In Seismic Risk Zone 1 , minor earthquakes. No known active faults.	Wind and water erosion would be at same rates. 3,700 acres susceptible to wind erosion. 3,400 acres susceptible to water erosion. 1,850 acres susceptible to soil compaction.	Same as primary,but 2 less stream crossings. Fisheries: Impacts slightly greater than proposed route.	None

TERRESTRIAL VEGETATION	TERRESTRIAL WILDLIFE	CULTURAL RESOURCES	VISUAL RESOURCES	LAND USE	TRANSPORTATION AND UTILITY NETWORKS	RECREATION RESOURCES	SOCIAL AND ECONOMIC CONDITIONS
An estimated 753 acres of forest land, 149 acres of riparian vegetation and 601 acres of grassland-range would be clear cleared for construction; about 628 acres of forest land and 124 acres of riparian habitat would be maintained free of mature trees.	Habitat loss of 403 acres. Loss of big game winter range. No known threatened or endangered species	Potential impact on listed cultural resource sites.	Moderate to high impact from construction reducing to low impact during operation.	Construction impacts on about 1,440 acres. Operation would require about 1,080 acres. Construction would cause nuisance impacts to land use and wilderness resources on public lands Crossing of Lubrecht Experimental Forest.	Utilizes about 12 miles of existing corridors. Traffic disruption would be more severe than for the primary route.	Fewer impacts to recreation, but of the same type general losses to recreational quality.	Short term impacts on housing and services in Sanders, Missoula, Powell, Deer Lodge, and Silver Bow.
Cleared land: 73 acres forest 2,479 acres grassland, 468 acres riparian 287 acres wetland Maintained land: 59 acres forest 308 acres riparian 2 endangered and 2 threatened species could occur within the corridors.	Waterfowl nesting near Lake Mason. Whitetailed deer near Ft. Peck Lake. Grouse habitat near Williston, Stanley and Devel's Lake. Impact on waterfowl in prairie potholes. Potential bald eagle nesting habitat near Agassiz Dunes. Possible black-footed ferret habitat.	Potential impacts on 94 prehistoric archeological sites, 36 historical sites and 6 known fossil localities. Potential impacts impacts on unrecorded cultural resources.	Moderate impact during construction, low to none for operation period. Meets requirements for Class III, in that it should be subordinate to the landscape.	Construction would cause nuisance impacts near urban fringe areas. Construction and oil spill risk impacts to about 1,190 acres of prime farm lands. Poss. impact to wilderness resources at 5 locations on public land.	Utilizes about 350 miles of existing corridors. Possible damage during construction to other transportation and utility facilities.	Wildlife associated impacts along Prairie Pothole Region (eastern MT and ND) crossing of Lewis and Clark Nat'l Historic Trail at Missouri R. Impacts to fishing.	Housing strain, strain on community facilities. Increase in personal income, and employment.
Cleared land: 2,844 acres grassland range 48 acres forest land 607 acres wetland 226 acres riparian Maintained land: 41 acres forest land 190 acres riparian Agassiz Dunes Natural area would be crossed in MN	Short term wildlife loss from habitat destruction. Waterfowl impact from drainage and disturbance. Possible black-footed ferret habitat	Potential impact on listed cultural resource and Paleontological sites.	High to moderate visual impact during construction. Persisting as low to none for the life of the project.	Pipeline construction inconsistent with Forest Service objectives. Impact on wilderness resources at 1 location on public land. Construction and oil spill risk impacts to about 465 acres of prime farm land. Possible damage to tile drainage systems.	Does not utilize on existing corridor. Risk of electrocution or pipeline from voltage induced by DC ground electrode.	Impacts on fishing and hunting; impacts on visiting Theodore Roosevelt Memorial Park. By visual and recreational losses on nat'l grasslands. Overall greater impacts than proposal.	Impacts on population, housing and services in MT, ND and MN would be similar to proposed route.

would go from Green Point to the vicinity of Port Williams, then cross the Strait of Juan de Fuca, Whidbey Island, Saratoga Passage and Camano Island from where it would proceed to the mainland near Stanwood. From there it would continue east past Arlington and then south to North Bend. This route would be about 73 miles shorter than the proposed route around Puget Sound.

Construction of approximately 20 miles of submarine pipeline across the Strait of Juan de Fuca and Saratoga Passage would result in temporary degradation of marine water quality, and during operation there would be an increase in the risk of marine oil spills. An oil spill would cause impacts on tne marine resources of the Strait and Puget Sound.

Impacts along the land segments of the pipeline would be similar to those for the proposed route.

Construction costs for the initial throughput would be about $9.3 million greater for the cross Sound route, and the additional costs for the ultimate throughput, about $.5 million less than for the proposed route. Operational costs would be lower.

Stampede Pass, Washington. This route (fig. 10) was originally designated by NTPC as the proposed route. Serious environmental problems plus major public and governmental opposition resulted in the selection of Snoqualmie Pass as the proposed route and the designation of Stampede Pass as the principal alternative. It is 13.5 miles shorter than the proposed route. Twenty-eight miles of it are in the Green River watershed which supplies water to the cities of Tacoma and Seattle. Except for the potential impacts on municipal water supply system, most impacts would be similar to those on the proposed route.

ROUTE SEGMENT ALTERNATIVES

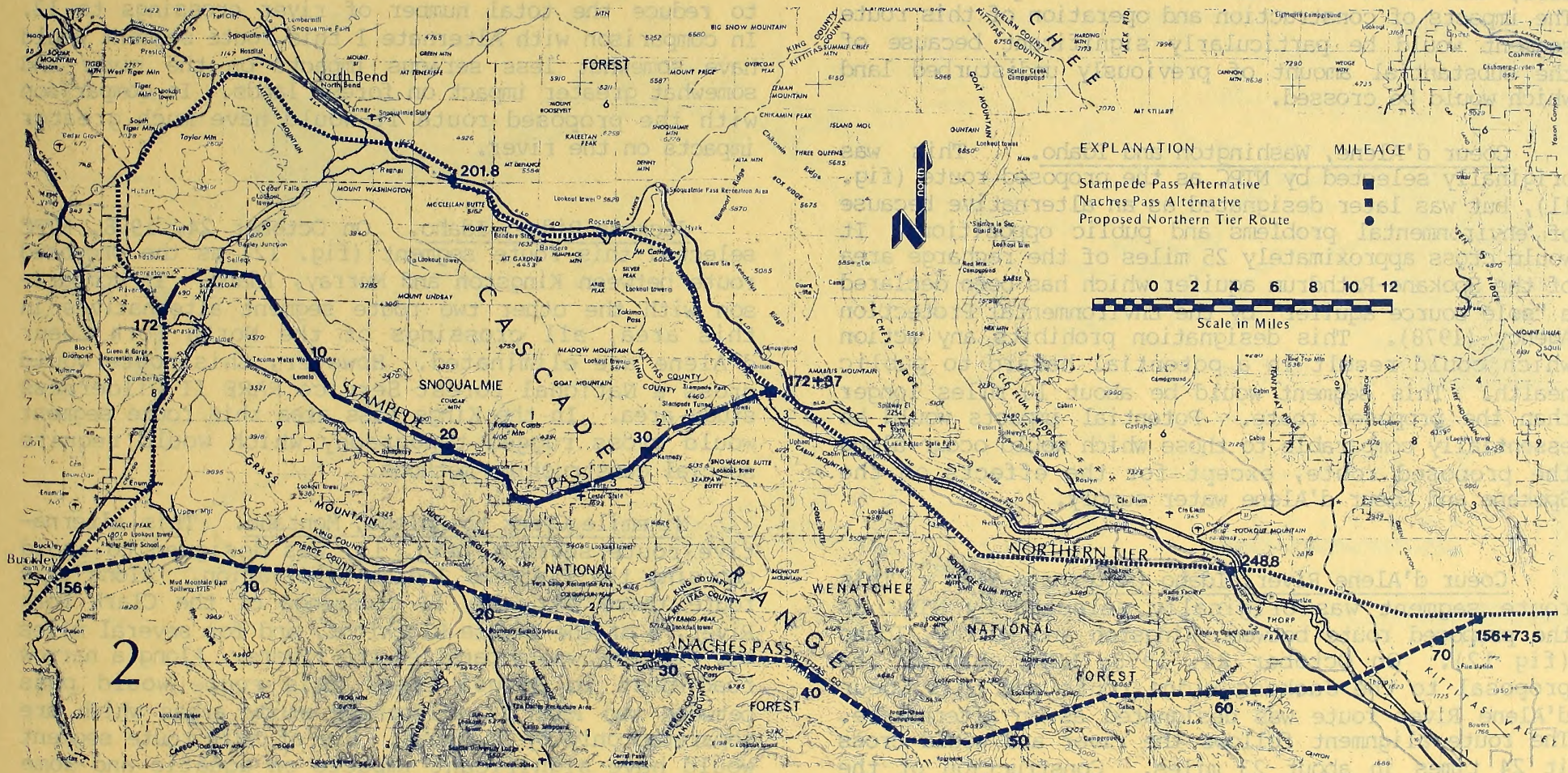


Figure 10.

Naches Pass, Washington. This alternative would leave the proposed route near Buckley in Pierce County, Washington pass up the White and Greenwater Rivers to Naches Pass, along the Little Naches River, across Manatash Ridge, and down the Yakima River, rejoining the proposed route about 8 miles north of Ellensburg (fig. 10). This route is 25 miles shorter than the proposed route, but it does not follow existing corridors, and about one-third is not easily accessible. The impacts of construction and operation of this route segment would be particularly significant because of the substantial amount of previously undisturbed land which would be crossed.

Coeur d'Alene, Washington and Idaho. This was originally selected by NTPC as the proposed route (fig. 11), but was later designated as an alternative because of environmental problems and public opposition. It would cross approximately 25 miles of the recharge area of the Spokane-Rathdrum aquifer which has been declared a "sole source aquifer" by the Environmental Protection Agency (1978). This designation prohibits any action which could result in a potential hazard to public health. This segment would be about 10 miles longer than the proposed route. Potential impacts would be essentially comparable to those which would occur along the proposed route, except for the effects on the Spokane and Coeur d'Alene water supply.

Coeur d'Alene River, Idaho (Alternate 1). This route segment was originally selected by NTPC as the proposed route between Kingston and Murray, Idaho (fig 12). On October 24, 1978, NTPC changed its proposal to the Jackass Ridge route and this Coeur d'Alene River route was designated as an alternative. The route alignment follows the river and would cross it 24 times in about 23 miles. Construction of the numerous river crossings and the potential of an oil spill into the river would be significant impacts along the route of this alternative.

Coeur d'Alene River, Idaho (Alternate 2). This alternative route (fig. 12) from Kingston to Murray, Idaho would follow fairly closely the Coeur d'Alene River Alternate 1 discussed above. This route differs in four places which have been changed in order to reduce the total number of river crossings to 12. In comparison with Alternate 1 this route segment would have somewhat less serious impacts on the river and somewhat greater impact on forest lands. In comparison with the proposed route it would have much greater impacts on the river.

Jackass Ridge, Idaho. On October 24, 1978, NTPC selected this route segment (fig. 12) as the proposed route between Kingston and Murray, Idaho. In comparison with the other two route segment alternatives in this area, all crossings of the North Fork Coeur d'Alene are eliminated. However, this route would cross a National Forest Service RARE II wilderness study area. In the Kings Pass area this route segment would cross rugged topography which would require special construction methods.

Ninemile Creek to Helena, Montana. This alternative route segment (fig. 13) was designed to avoid crossing the Flathead Indian Reservation. Along this route there would be 11 crossings of the Clark Fork River, 2 of the Little Blackfoot, and for several miles the pipeline would parallel the rivers. Along a narrow road next to Siegel Creek this route would pass between two RARE II wilderness study areas which are separated only by the road. Use of this route segment would have significant impacts on aquatic and some terrestrial resources.

ROUTE SEGMENT ALTERNATIVES

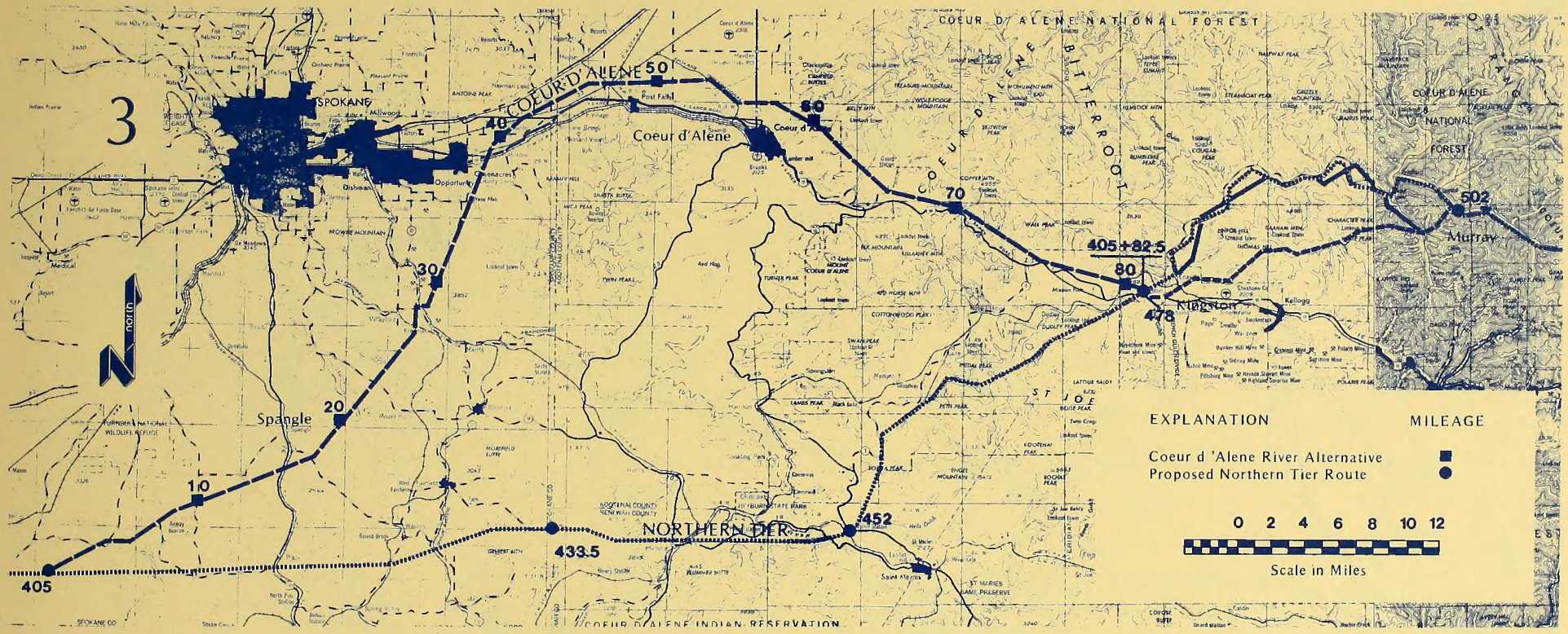


Figure 11.

ROUTE SEGMENT ALTERNATIVES

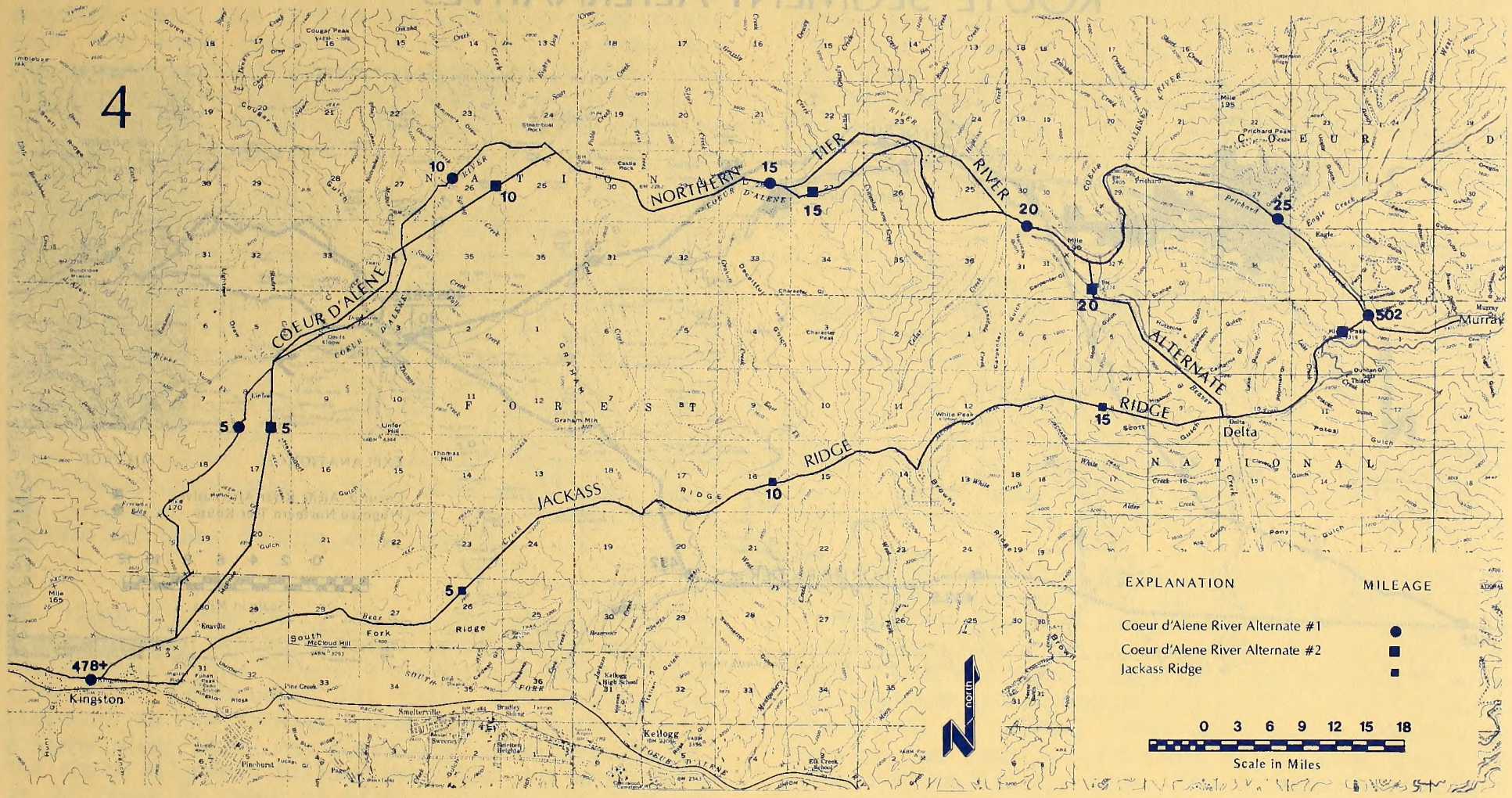


Figure 12.

Ninemile Creek to Helmville, Montana. This route segment (fig. 13) would be another alternative to the proposed route which crosses the Flathead Indian Reservation. Portions of it follow the same route as the Ninemile Creek to Helena alternative but the total mileage is somewhat less. Along this route the pipeline would cross the Lubrecht Experimental Forest. Overall impacts on aquatic and terrestrial resources would be significant.

ROUTE SEGMENT ALTERNATIVES

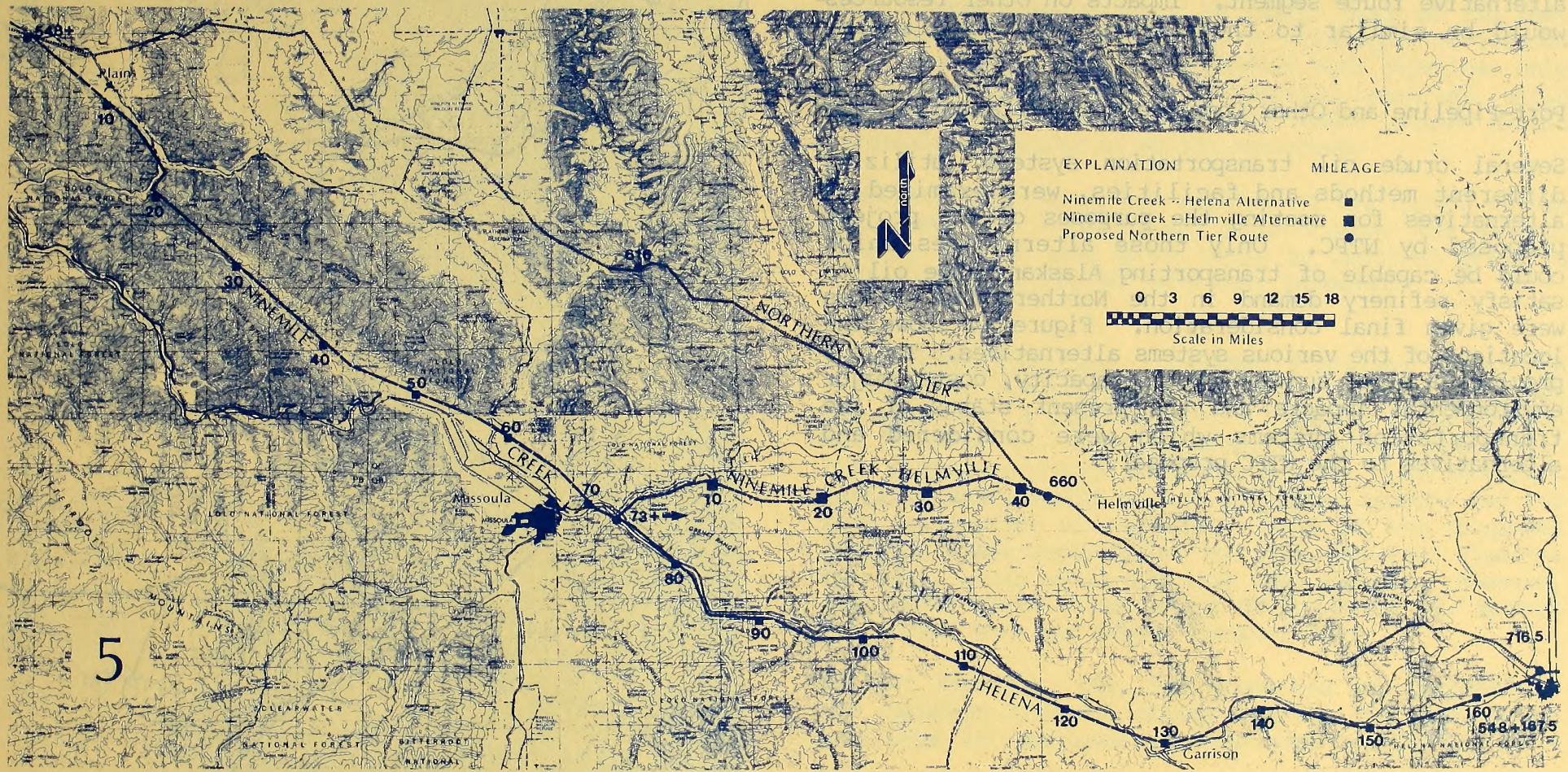


Figure 13.

Harlowton, Montana to Clearbrook, Minnesota. This segment was originally the proposed route, but became an alternative when NTPC changed to a northern route paralleling the Portal Pipeline. Short-term impacts to soil productivity, disturbance of aquatic resources at numerous stream crossings and construction across wetlands and prairie pothole areas would be significant environmental impacts along this route. Crossing the Little Missouri Grasslands, a National Wildlife Refuge, waterfowl production areas, and other natural areas would be critical environmental effects of using this alternative route segment. Impacts on other resources would be similar to those on the proposed route.

Port-Pipeline and Other Complete Transportation Systems

Several crude oil transportation systems, utilizing different methods and facilities, were examined as alternatives for meeting the purposes of the project proposed by NTPC. Only those alternatives which could be capable of transporting Alaskan crude oil to satisfy refinery demand in the Northern Tier states were given final consideration. Figure 14 shows the locations of the various systems alternatives. Table 8 provides a brief summary of the capacity, costs, major environmental impacts and the present status of the transportation systems which were considered and alternatives to the NTPC proposal.

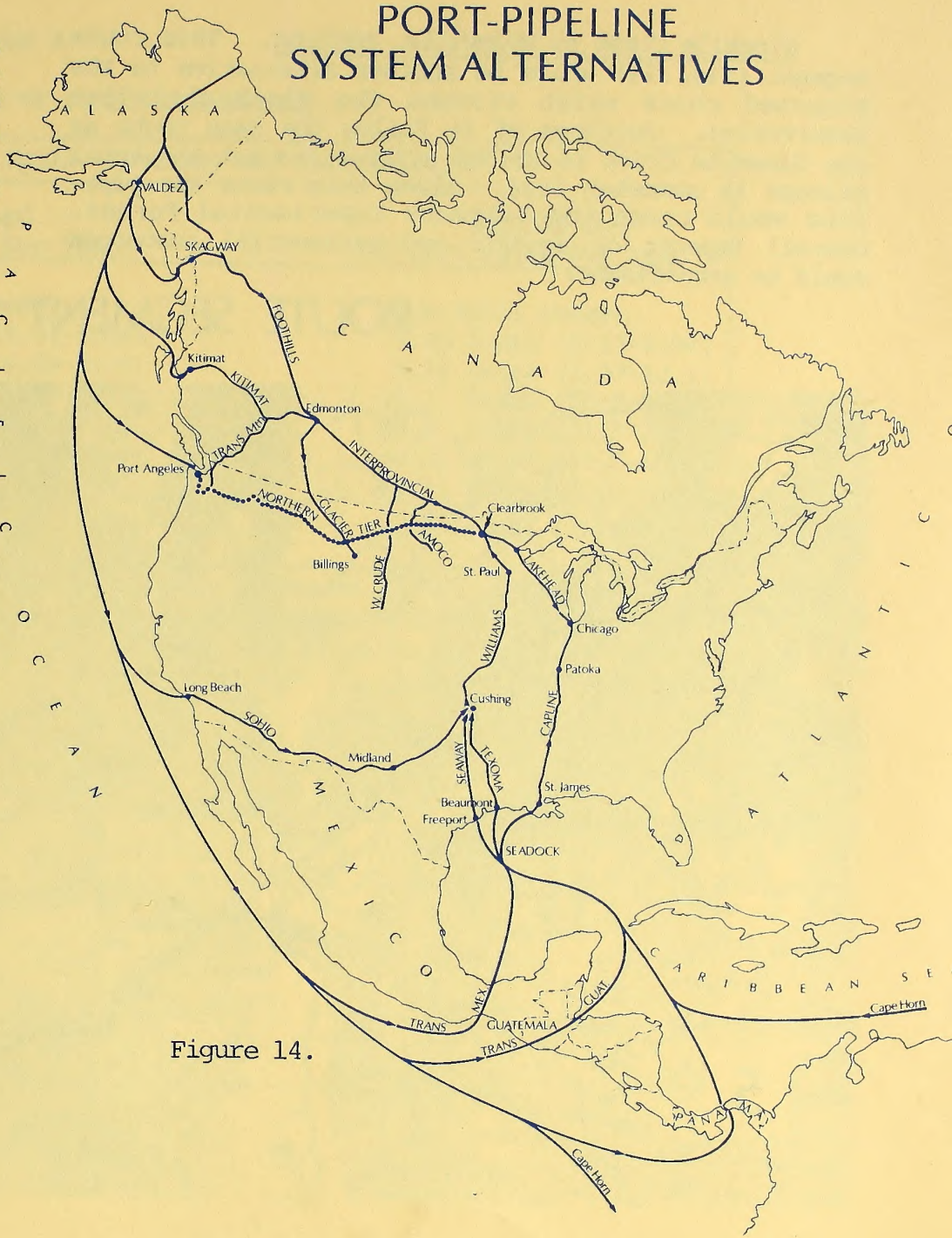


Figure 14.

L. D. Mills

Alaska-Alberta Pipeline (Foothills). This proposal by Foothills Pipe Lines (Yukon) Ltd. has four possibilities falling into two categories. The first two would transport Alaskan North Slope crude oil only, taken from the Alyeska Pipeline at Delta Junction, Alaska. The other two could utilize both foreign and Alaskan oil received from tankers at the ports of Haines and Skagway. The pipeline routes would proceed via either Keg River, or Edmonton, Alberta, to a connection with the Interprovincial Pipeline System. The existing corridor of the Alaska Highway and Alaskan Natural Gas Pipeline would be used. Each of the four possibilities is designed for a throughput of 500,000 bpd. The Delta Junction proposals with pipelines only would have impacts only on terrestrial resources, while the Haines and Skagway proposals would include marine terminals and risks to marine resources.

Foothills Pipe Lines has applied to the United States Government for right-of-way permits under the Mineral Leasing Act of 1920 which would be required prior to construction of any of their four proposals.

Kitimat Pipeline. Kitimat Pipeline, Ltd., has proposed to construct an oil port at Kitimat, British Columbia, and a pipeline with a capacity up to 700,000 bpd to Edmonton, Alberta, where it would connect with the Interprovincial Pipeline System. At the port facility there would be air pollution impacts and the risk of marine oil spills. Much of the proposed pipeline route would follow the Trans Mountain Pipeline corridor, which would minimize some impacts. However, the route would cross about 90 miles of Mt. Robson Provincial Park and Jasper National Park.

Kitimat Pipeline, Ltd. has presented its proposal to the Canadian National Energy Board. The application was held in abeyance pending the completion of a

TABLE 8 SUMMARY OF PORT-PIPELINE SYSTEMS

PORT AND PIPELINE ALTERNATIVES	PROPOSAL SPONSOR DATE	PORT AND PIPELINE LOCATION	THROUGHPUT CAPACITY (Barrels per day)	PIPELINE DISTANCE AND DIAMETER
NORTHERN TIER PROPOSAL	Northern Tier Pipeline Company, Billings, MT Application filed April 18, 1977 to DOI and on June 30, 1978 to EFSEC	Port Port Angeles, WA Pipeline Port Angeles, WA through ID, MT, and ND to Clearbrook, MN	Initial phase 709,000 Ultimate phase 933,000	1,557 miles; 40 and 42 inches
ALASKA-EDMONTON	Foothills Pipelines (Yukon) Ltd., Calgary, AB, Canada June 12, 1978	Port Haines, AK Skagway, AK Pipeline 1. Delta Junction, AK to Edmonton, AB 1a. Delta Junction, AK to Keg River, AB 2. Skagway, AK to Edmonton, AB 2a. Skagway, AK to Keg River, AB Connecting to Interprovincial System	1. 500,000 1a. 500,000 2. 500,000 2a. 500,000	1. 1,505 miles; 30 inch 1a. 1,136 miles; 30 inch 2. 1,091 miles; 30 and 36 inches 2a. 721 miles; 30 and 36 inches
KITIMAT-EDMONTON	Kitimat Pipeline Ltd. Proposed to Canadian National Energy Board December 8, 1976	Port Kitimat, British Columbia, Canada Pipeline Kitimat to Edmonton, AB, Canada Connecting to Interprovincial System	Initial phase 400,000 Ultimate phase 700,000	753 miles; 36 inch

CONSTRUCTION COST (millions)	PROJECT COMPLETION	TRANSPORTATION (Cost per barrel)	ENVIRONMENTAL IMPACT	PRESENT STATUS
1978 U.S. $ Initial phase $1,152 Ultimate phase $42 additional	Construction time estimated for completion in 22 months after Federal, state, and local approval	1978 Tariff rates (U.S. $) Initial phase $1.30 Ultimate phase $1.11 From Port Angeles to Clearbrook, MN then via Lakehead Pipeline to Chicago, IL	Port Construction-impacts marine resources Operation--air quality, oil-spill risks Pipeline Construction--aquatic and terrestrial resources Operation--marine and terrestrial oil-spill risk	Permit to cross Federal lands pending before DOI. Site certification permit pending before Washington EFSEC Final Federal ES to be completed May 1, 1978 State ESs being prepared in WA, MT, and MN
1978 U.S. $ $1,324 1,097 996 771	No estimates available	1978 Tariff rates (U.S. $) $2.39 2.44 1.94 1.98 From Skagway or Delta Junction, AK to Edmonton, AB via Interprovincial Pipeline to Chicago, IL	Port Construction--marine resources Operation--air quality and navigation, oil-spill risk Pipeline Construction--aquatic and terrestrial resources and recreational resources (provincial and national parks) Operation--marine and terrestrial oil-spill risk	A September 1978 study by the Canadian National Energy Board recommended against a West Coast transshipment port partly serving Canada with foreign crude oil.
1977 U.S. $ (millions) $680	Construction time estimated for completion in 22 months after Canadian National Energy Board approval	1977 Tariff rates (U.S. $) $1.25 From Kitimat to Edmonton then via Interprovincial and Lakehead Pipelines to Chicago, IL	Port Construction--marine resources Operation--air quality and navigational, oil-spill risk Pipeline Construction--aquatic and terrestrial resources and recreational resources (provincial and national parks) Operation--marine and terrestrial oil-spill risk	A September 1978 study by the Canadian National Energy Board recommended against a West Coast transshipment port partly serving Canada with foreign crude oil.

TABLE 8 SUMMARY OF PORT-PIPELINE SYSTEMS

	PROPOSAL SPONSOR DATE	PORT AND PIPELINE LOCATION	THROUGHPUT CAPACITY (Barrels per day)	PIPELINE DISTANCE AND DIAMETER
TRANS MOUNTAIN REVERSAL	Trans Mountain Oil Pipeline applied to Washington EFSEC, April 28, 1977	Port Cherry Point near Ferndale, WA Pipeline Existing Trans Mountain from Cherry Point, WA to Edmonton, AB, Canada	Alternating flow 190,000 Full reversal 350,000	Edmonton, AB to Vancouver, B.C. 718 miles; 24 inch Sumas to Puget Sound 74 miles; 16 inch
LONG BEACH-MIDLAND, TEXAS	SOHIO Transportation Company of California proposed in 1976 to DOI	Port Long Beach, CA Pipeline Existing natural gas pipeline and new construction from Long Beach, CA to Midland, TX	Dominquez Hills storage in Long Beach 200,000 Long Beach, CA to Midland, TX 500,000	Existing 790 miles; 30 and 26 inches New 34 miles; 30 inch 194 miles; 42 inch 9 miles; 48 inch Total pipeline distance 1,027 miles.
TRANS-MEXICO	Barber Oil Company proposed to DOE Hearings, Wash. D.C. July 10, 1978	Port SPM off Salina Cruz Mexico Pipeline Salina Cruz to Coatzacoalcos; then by tanker to Gulf Coast Ports	1,750,000	165 miles; 36 and 48 inches
TRANS-GUATEMALA	Central American Pipeline Co. proposed to DOE Hearings, Wash., D.C., July 10, 1978	Port Fixed-berths at Buena Vista and Puerto Barrios Pipeline Across Guatemala between above ports; then by tanker to Gulf Coast ports	Initial phase 1,200,000 Ultimate phase 1,500,000	227 miles; 42 inch
TANKER-U.S. MID-CONTINENT PIPELINES	No specific sponsor	U.S. tankers, Panama Canal, U.S. tankers, Mid-Continent Pipelines	Panama Canal capacity at 500,000	Use existing Panama Canal and U.S. Mid-Continent Pipelines
PANAMANIAN TRANS-SHIPMENT	Northville Industries Corp., Huntington Station, N.Y. Proposal submitted on May 30, 1978 to DOE Hearings, Wash., D.C.	Port Puerto Armvelles, Panama Shuttle tankers through Panama Canal	Initial phase 425,000 Ultimate phase 900,000	Use existing Panama Canal and U.S. Mid-Continent Pipelines

CONSTRUCTION COST (millions)	PROJECT COMPLETION	TRANSPORTATION (Cost per barrel)	ENVIRONMENTAL IMPACT	PRESENT STATUS
1977 U.S. Alternating flow $60 Full reversal $85	1 year after approval by U.S. and Canadian Governments	1977 Tariff rates (U.S. $) Alternating flow $1.30 Full reversal $1.09 From Cherry Point, WA to Edmonton, AB, Canada via Interprovincial and Lakehead Pipelines to Chicago, IL	Port Construction--marine resources Operation--oil-spill risk Pipeline Construction--pump stations Operation--oil-spill risk	Marine Mammal Protection Act--1972 prevents permits for facilities expansion in Puget Sound for crude oil transshipment. Trans Mountain Oil withdrew application March 27, 1978.
1977 U.S. $ $526	2 years after approval of Federal, state, and local permits	1977 Tariff rates (U.S. $) $1.53 From Valdez, AK to Midland, TX	Port Construction--marine resources Operation--air quality at Long Beach; oil-spill risk Pipeline Construction--aquatic and terrestrial resources; transmission lines Operation--oil-spill risk	DOI approved permit for crossing Federal lands. SOHIO seeking approval for California permits.
1978 U.S. $ $526	None available	1978 Tariff rates (U.S. $) $1.65 From Valdez, AK to Houston, TX	Port Construction--SPMs, terminal and tank farm Operation--oil-spill risk Pipeline Construction--impacts Operation--oil-spill risk Many unknown impacts.	No applications to U.S. or Mexican Governments. Project considered to be in early planning stages.
1976 U.S. $ $717	Estimated to be 3 years	1977 Tariff rates (U.S. $) $1.99 From Valdez, AK to Guatemala, through pipeline and by tanker to Houston., TX.	Port Construction--fixed berths, terminal and tank farm Operation--oil-spill risk Pipeline Construction--impacts Operation--oil-spill risk Many unknown impacts	Preliminary CAPICO agreement with Guatemala Government. Project involves export of Alaska crude which is illegal due to Alaska Natural Gas Act.
Actual cost unknown.	None	None available	Port Marine impacts from oil spills, including tanker lightering	Panama Canal below capacity. Mid-Continent Pipelines have no spare capacity projected through 1980.
1978 U.S. $ Terminal $47.5	December 1978	1978 Tariff rates (U.S. $) $2.46 Cost estimated from Valdez, AK to Gulf Coast ports.	Port Construction--marine resources, air quality, and Panama Canal traffic Operation--oil-spill risk	Terminal now under construction for completion by December 1978. Mid-Continent Pipelines have no spare capacity projected through 1980.

national Energy Supply and Demand study. In September 1978, the study concluded that a west coast crude oil transshipment facility would not benefit Canada. This decision precludes further development of the Kitimat proposal. At this time, Kitimat Pipeline, Ltd. has neither reactivated its proposal nor withdrawn it from the National Energy Board.

Trans Mountain Pipeline Reversal. Trans Mountain Oil Pipeline Corporation has proposed to first alternate the flow, and then to fully reverse the flow of the existing Trans Mountain Pipeline from Cherry Point, Washington, to Edmonton, Alberta, Canada. The alternating flow phase would transport 190,000 bpd through the existing Trans Mountain Pipeline to Edmonton where it would connect with the Interprovincial Pipeline System for ultimate delivery to Clearbrook, Minnesota. The full reversal phase would transport 350,000 bpd through the same pipeline system to Clearbrook.

Environmental impacts upon Puget Sound marine resources would result from port expansion. Construction of new pump stations would cause the only substantial land use impacts along the existing pipeline route. During operation, oil spills could affect Puget Sound marine resources, major rivers, fisheries, terrestrial vegetation and wildlife.

The 1977 amendment to the Marine Mammal Protection Act of 1972 prohibits issuance of federal permits for the expansion of crude oil transshipment facilities in Puget Sound. In response to this legislation, Trans Mountain Oil Pipeline has withdrawn its application.

Long Beach, California to Midland, Texas. SOHIO Transportation Company of California proposed this system, consisting of port facilities and storage at Long Beach, California, and a pipeline combining new segments with the reversal of an existing gas pipeline to Midland, Texas. The proposed throughput would be 700,000 bpd of which 200,000 bpd would remain in the Los Angeles area with 500,000 being transported via the pipeline to Midland, Texas.

Critical environmental impacts could result from marine oil spills and air quality deterioration in the Long Beach vicinity, and from new transmission lines across undisturbed desert country. There could also be adverse impacts on terrestrial and aquatic resources from construction across the Colorado River, other major streams and fragile desert habitat.

The Department of the Interior has approved the permit for crossing federal lands, and now SOHIO is seeking approval for construction and operation from the states of California, Nevada, New Mexico and Texas.

Trans-Mexico Pipeline. The Barber Oil Company has proposed a system consisting of a tanker terminal with onshore storage at Salina Cruz, Mexico, a pipeline with 1,750,000 bpd capacity for 165 miles across Mexico to another terminal constructed at Coatzacoalcos, Mexico, on the Gulf Coast. Tankers would then deliver the crude oil to United States ports on the Gulf Coast.

There would be the risk of marine resource impacts similar to other proposals using marine transportation routes. Construction impacts along the pipeline corridor are not known. The proposal is considered to be in early planning stages. No applications for permits have been made to the United States or Mexican Governments.

Trans-Guatemala Pipeline. The Central American Pipeline Company has proposed a system with single

point moorings for tanker unloading onshore storage facilities at Buena Vista on the Pacific Coast and Puerto Barrios on the Caribbean Coast of Guatemala, and a connecting pipeline 227 miles long. Tankers would then transport the crude oil to U.S. ports. Ultimate crude oil capacity of the pipeline system would be 1.5 million bpd. Risk of marine resource impacts would be similar to other systems using sea routes. There are no known data about possible impacts along the pipeline corridor.

The company has a preliminary agreement with the Guatemalan Government, but the project may conflict with the provision of the Trans-Alaska Pipeline Authorization Act which requires United States control of the transportation of Alaskan crude oil. This project is considered to be in the early planning stages.

Tankers and the Mid-Continent Pipeline System. West Coast crude oil could reach United States ports on the Gulf of Mexico and the east coast by tanker around Cape Horn or through the Panama Canal. Either tanker route would have to utilize the Mid-Continent Pipelines to reach the Northern Tier states.

The Mid-Continent Pipelines consist of a network of pipelines which transport foreign and domestic crude oil to redistribution centers and refineries throughout the mid-continent region (fig. 15). Most of these lines are operating at nearly full capacity but there is capability for expansion by about 875,000 bpd. No pipeline company has indicated the intention to expand its system at this time.

If larger tankers (200,000-290,000 dwt) become available to transport crude oil from Valdez, the route around Cape Horn could require fewer tanker trips, and could reduce the frequency of lightering to smaller tankers for passage through the Panama Canal, thus reducing oil-spill risks. However, hazardous navigation around the Cape would add to the tanker casualty risk.

Transshipment of crude oil through the Panama Canal involves 80,000 to 250,000 dwt tankers transporting crude oil from Valdez to Panama, off-loading to 65,000 dwt vessels that can pass through the canal and continue to the Gulf Coast ports. It is estimated by the Department of Energy that the capacity for this alternative is 500,000 bpd.

Lightering at the canal would increase emissions of hydrocarbon vapors and the oil-spill risks inherent in additional loading and unloading operations. Using smaller tankers also increases total tanker traffic.

The Mid-Continent Pipelines could move oil to the Northern Tier states under any of the alternate tanker systems that deliver oil to Gulf Coast ports. In the absence of specific proposals, analysis of environmental impacts is not possible at this time.

Panamanian Transshipment. The Northville Industries have proposed constructing a transshipment port at Puerto Armuelles, Panama. It would be designed to receive large tankers from Valdez, and would include storage tanks from which the oil would be reloaded into shuttle tankers for passage through the Panama Canal and then to Gulf ports. It is planned for initial throughput of 425,000 bpd. It would be capable of future expansion to about 900,000 bpd.

Environmental impacts would occur from port construction of the terminal and increased traffic on the Panama Canal. Operational impacts would be potential oil spills in the marine environment and increased air quality impacts. Crude oil delivered to the Gulf Coast ports would have to be transported through the Mid-Continent Pipelines which were described above.

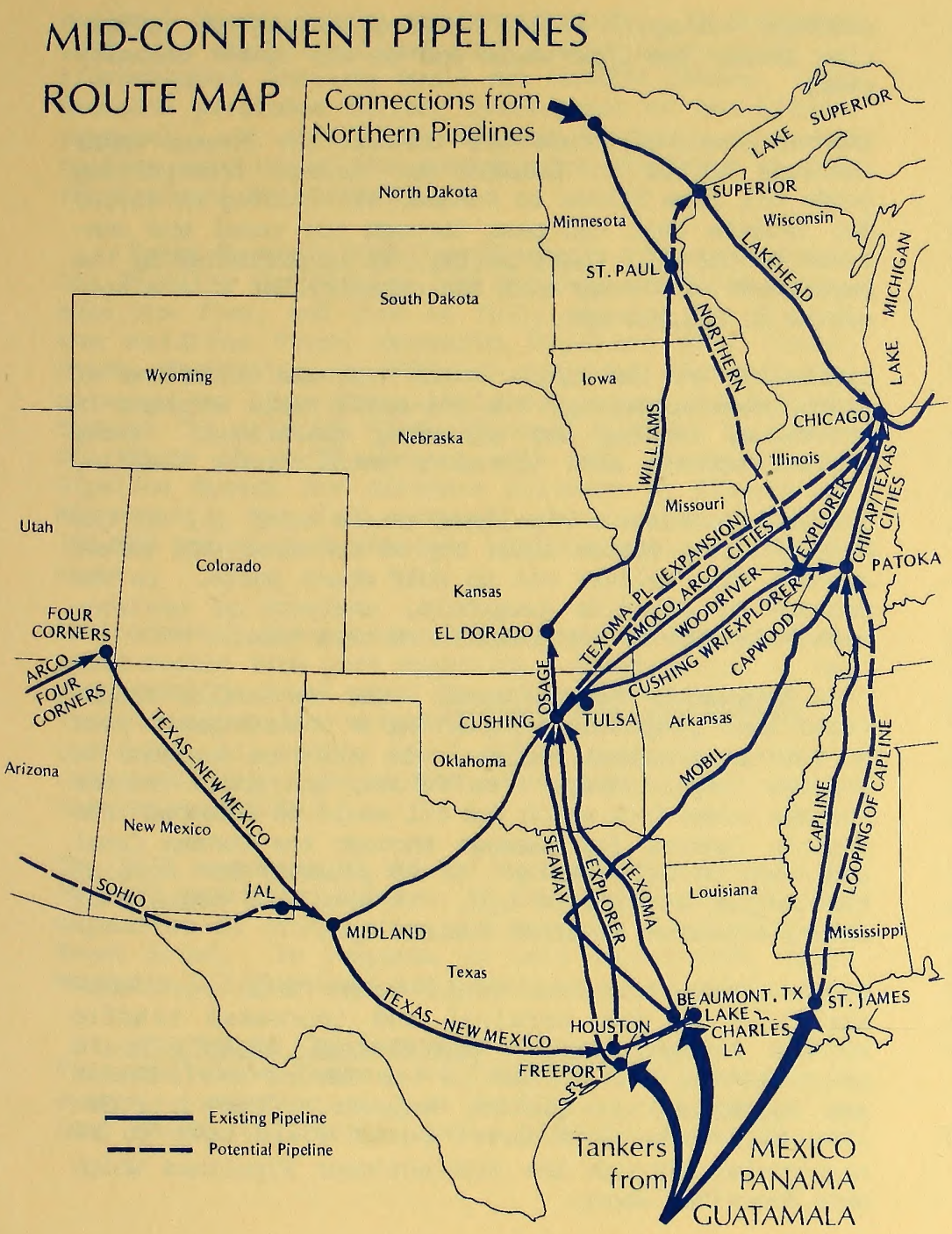


Figure 15.

The Draft Environmental Statement consists of two parts; one contains the narrative and the other, the Map Addendum, has maps, charts, and tables and is designed to be used with the narrative. The following paragraphs provide brief descriptions of the material to be found in each section of the DES.

Chapter 1--Description of the Proposed Action

Chapter 1 describes the project as proposed by the Northern Tier Pipeline Company. It includes a statement of the purpose and objectives of the proposal, and consideration of the projected petroleum supply and demand in the United States. The location of all facilities, construction methods and materials, operating procedures for the proposed facilities, proposed construction schedules and stages of implementation, cost estimates, and expected project life are all described in detail. All project related actions proposed by the permit applicant are considered, including those activities designed primarily to eliminate or minimize environmental impacts.

The chapter also identifies the federal authorizing actions which are required for the project and the ways in which the proposal interrelates with other federal, state, local, and private projects plans and policies.

1 DESCRIPTION OF THE PROPOSAL

L. D. Mills

Chapter 2--Description of the Environment

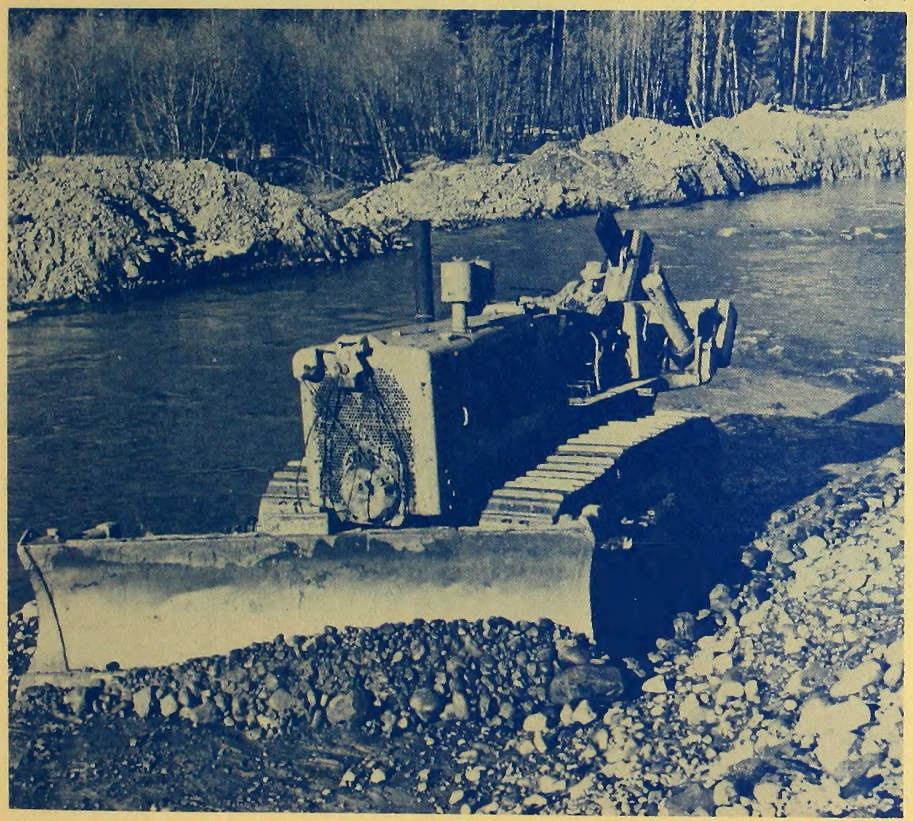
Chapter 2 describes the existing environment which would be affected by the proposed project. The description emphasizes those environmental components most likely to be affected by the proposed action. The chapter also provides an assessment of what the future environment of the area under consideration would be without project implementation. In this assessment an attempt is made to anticipate the effects of future natural processes and human activities on the environment.

The existing and future environment sections are divided into subsections for the port and onshore facilities and the pipeline system. In each subsection the environment is described in terms of the following components: climate, air quality, noise, topography and geology, soils, aquatic resources, marine resources, terrestrial vegetation, terrestrial wildlife, cultural resources, visual resources, land use, transportation and utility networks, recreation, and social and economic conditions.

2

DESCRIPTION OF THE ENVIRONMENT

Pacific Gas Transmission Company



Chapter 3--Environmental Impacts of the Proposed Action

Chapter 3 presents the analysis and evaluation of the magnitude, intensity, duration, and incidence of the environmental impacts of the proposed action. The analysis assesses the cause and effect relationships between the proposed action and the environment and identifies the adverse and beneficial, direct and indirect impacts that would probably occur if the proposed crude oil transportation system is constructed. Oil spill risk analyses for tankers in-transit and at-berth, for the onshore storage facility and the pipeline are included in this chapter.

The chapter is divided into two major sections, port and onshore facilities, and the pipeline system. Each section is subdivided according to the environmental components (see chapter 2 description) and by construction, operation, and abandonment phases of the proposed project. Brief impact summary statements introduce each environmental component subsection.

Impacts of the Proposal

3

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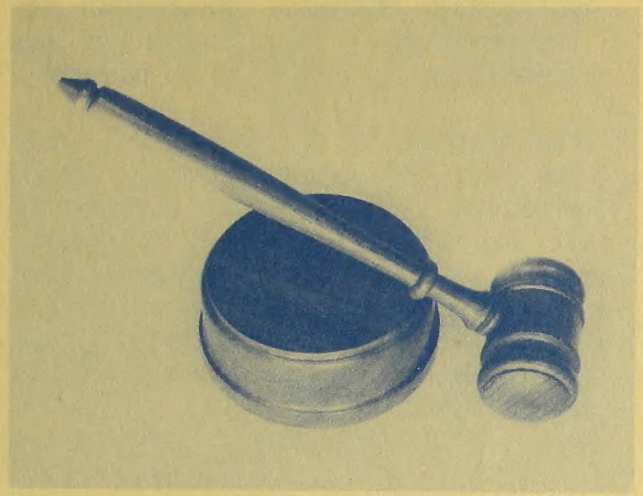
Chapter 4--Mitigation Measures Not Included in the Proposed Action

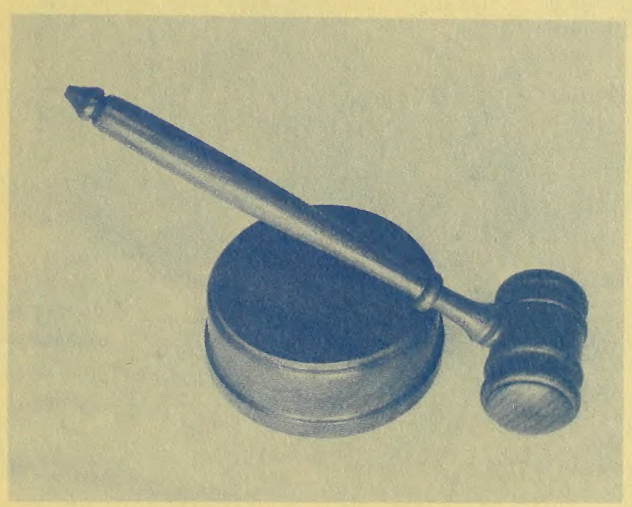
Mitigation measures are those actions which could minimize or eliminate an adverse impact which would occur if the proposal is implemented. Many impact reducing measures have been proposed by NTPC and most of them are included in the description of the proposal (chapter 1) as design features, construction reclamation methods, or operating procedures.

Chapter 4 presents a discussion of impact reducing measures proposed by NTPC but not included in chapter 1, and measures that government agencies have explicitly stated they would enforce if the proposal is implemented. In addition, possible mitigation measures which could significantly reduce adverse impacts but which have not yet been committed to by the applicant or any agency have been briefly identified. Chapter 4 includes subsections for each environmental component in which mitigation measures are described and the effectiveness of each is assessed.

Many site specific impacts, especially along the pipeline route, cannot be precisely identified at this stage in project development. For example, it is not known at this time where, within the 2-mile wide study corridor, construction impacts along a 90-foot wide right-of-way would occur. It can be anticipated that additional mitigation measures would be proposed, required, and enforced if the proposed project is implemented.



4 MITIGATING MEASURES



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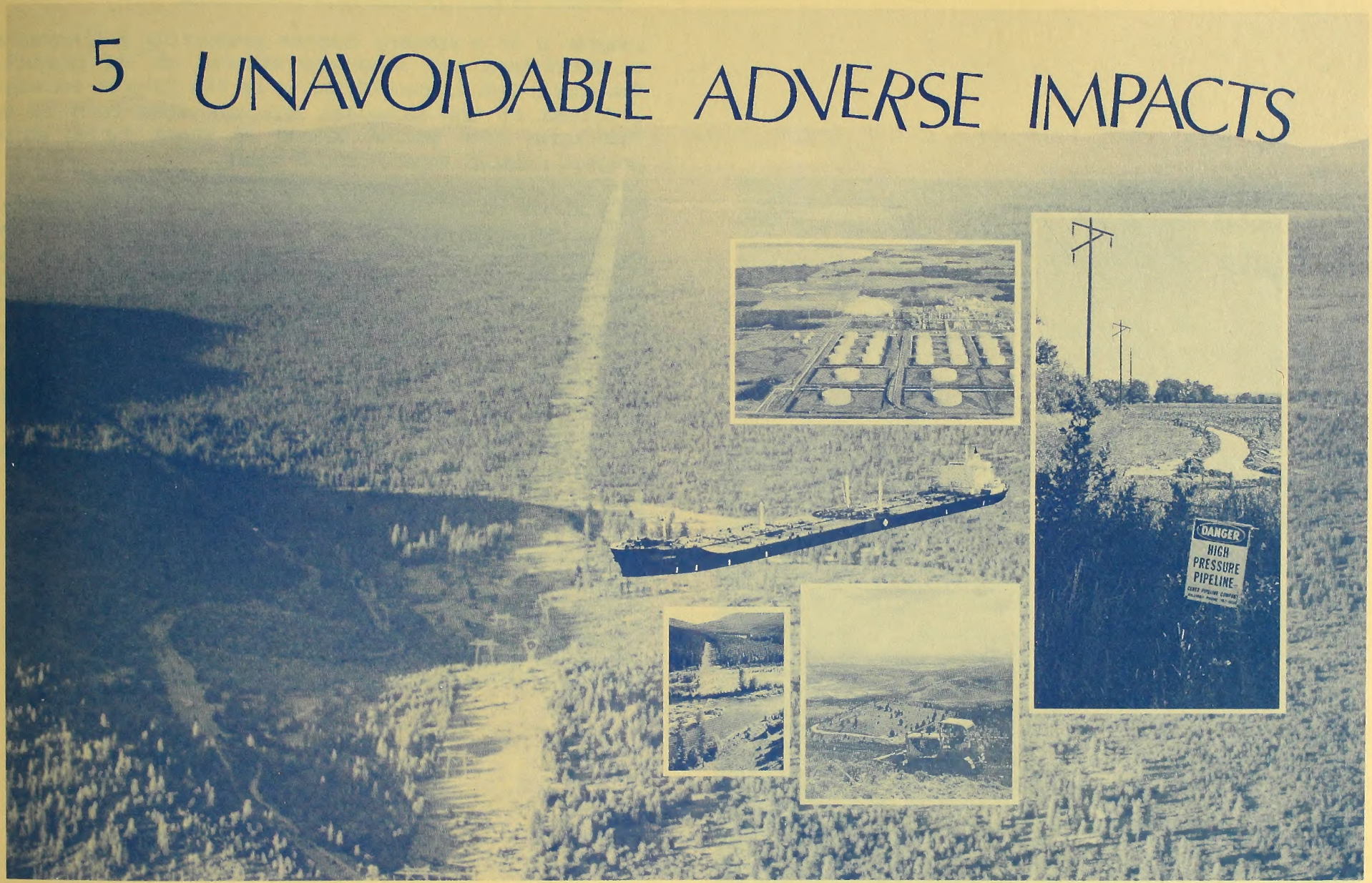
Chapter 5--Any Adverse Impacts Which Cannot be Avoided Should the Proposal be Implemented

The basic assumption for this chapter is that the proposal, as described in chapter 1, and the committed mitigation measures described in chapter 4 would be implemented. Impacts which would still occur are identified as unavoidable adverse, or residual impacts.

The chapter is divided into 2 major sections: one for the port and onshore storage facilities and one for the pipeline system. Each section is subdivided in terms of the 15 environmental components. Residual impacts which would result from construction and from operation of the proposal are discussed separately where appropriate. Impacts which could result from oil spills and from natural hazards damaging the facilities are also identified.

5 UNAVOIDABLE ADVERSE IMPACTS



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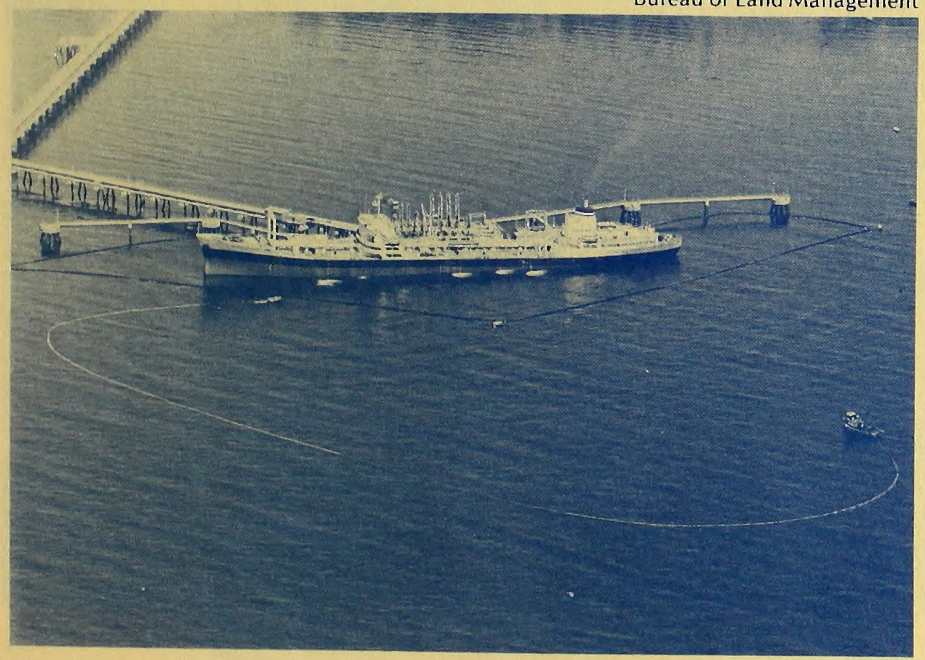
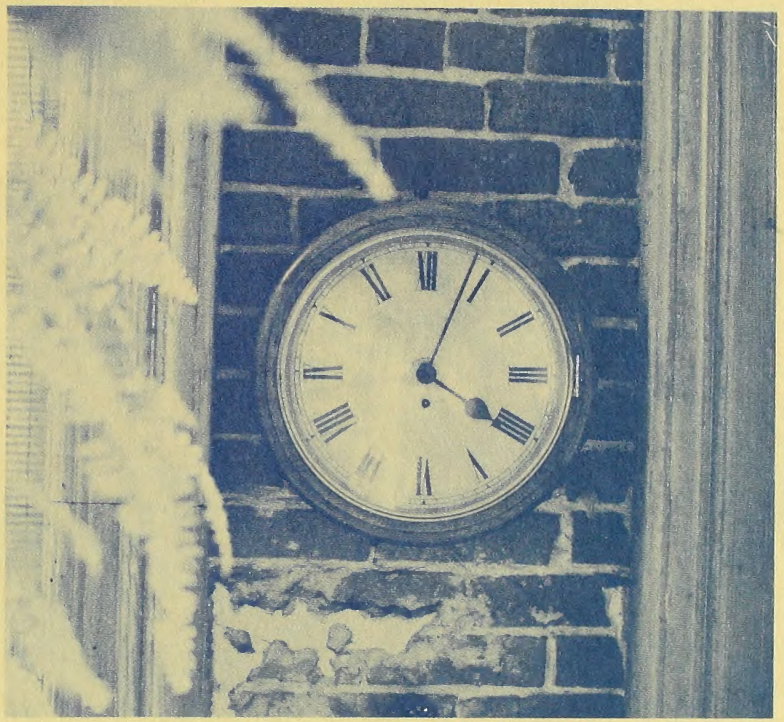


Chapter 6--The Relationship Between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

Chapter 6 is a summary chapter presenting a discussion of short-term and long-term effects of the project. The short-term is considered to be the 20-year economic lifetime of the proposal and the long-term is an indefinite time period beyond 20 years during which project related impacts could occur.

Short-term trade offs involving uses of environmental resources and values, risks to health and safety and the potential benefits which may result from the proposal are identified and the possible long-term implications of implementation of the proposal are discussed. The section on cumulative impacts presents a discussion of the potential effects of construction and operation of the facilities to provide 350,000 bpd of crude oil to the existing refineries on Puget Sound. This analysis includes detailed consideration oil-spill risks and explosion and fire dangers which would be associated with the expansion of facilities.

6
SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY



Chapter 7--Irreversible and Irretrievable Commitment of Resources

This chapter presents a brief summary of the irreversible and irretrievable commitments of resources which would occur if the proposal is implemented. Some resources would be literally consumed or disturbed, and therefore would be irretrievably lost or modified. Other considerations include environmental qualities or values which would be altered for the life of the project; and changes which, once initiated by implementation of the proposal, would continue into the long-term.

Various resources would be used (or committed, or altered) during the construction, operation, and abandonment phases of the proposed project. In addition, there is potential for additional commitments of environmental resources and values resulting from oil spills or leaks. The chapter contains descriptions of both kinds of commitments for the various environmental components.

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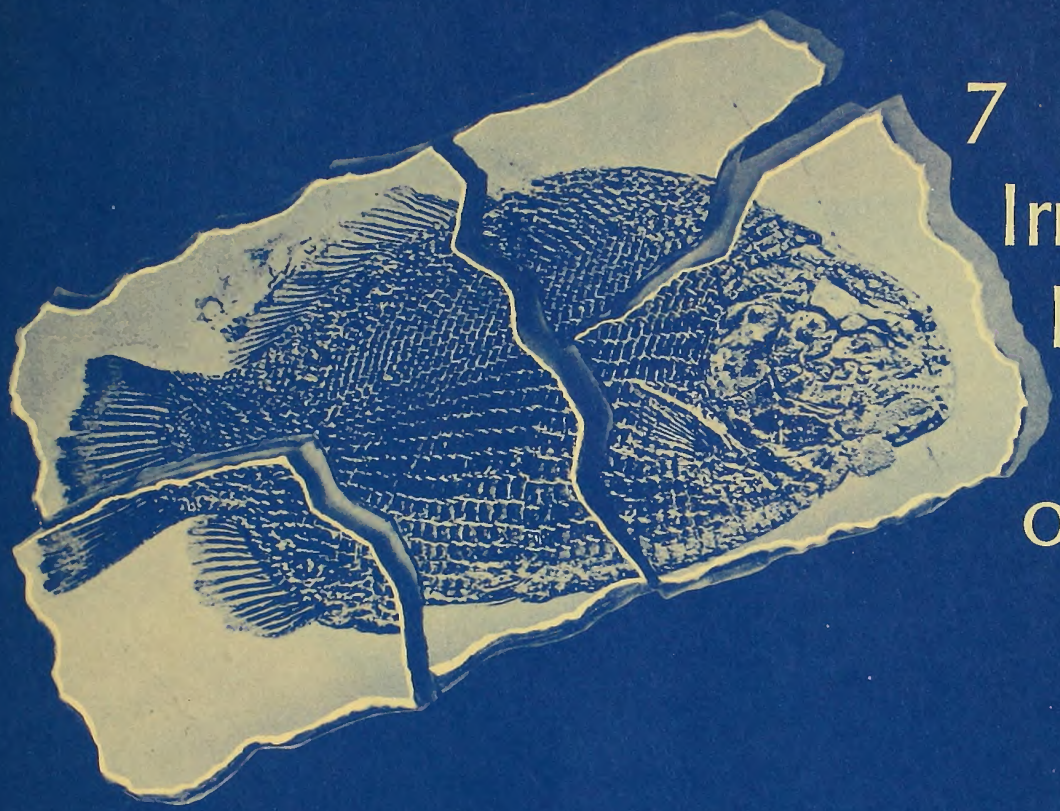

7 Irreversible and Irretrievable Commitment of Resources

Chapter 8--Alternatives to the Proposed Action

Chapter 8 presents detailed descriptions and analyses of the potential impacts of many possible alternatives to all or parts of the proposal. The alternatives include no action and delayed action, several port sites, numerous pipeline route segments and proposals for completely independent crude oil transportation systems. The location and current status of each alternative is described and impacts are analyzed. If adequate data was available, the alternatives were analyzed in the same way as the proposal. To facilitate comparisons the alternatives are displayed on maps, and summary tables with brief statements of impacts are included with narrative discussions.

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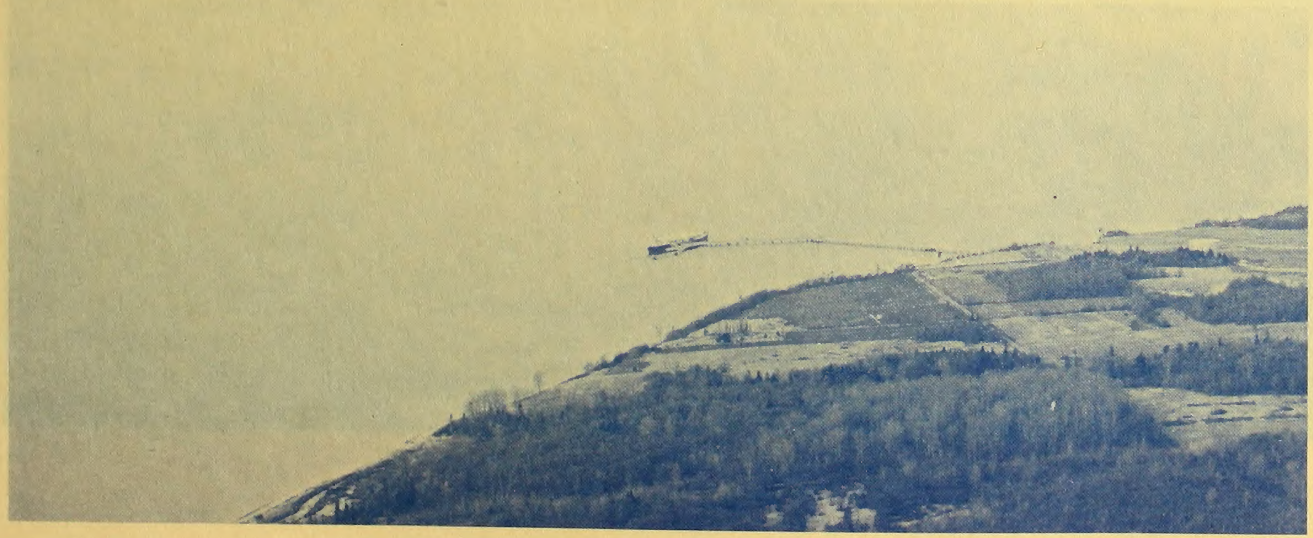

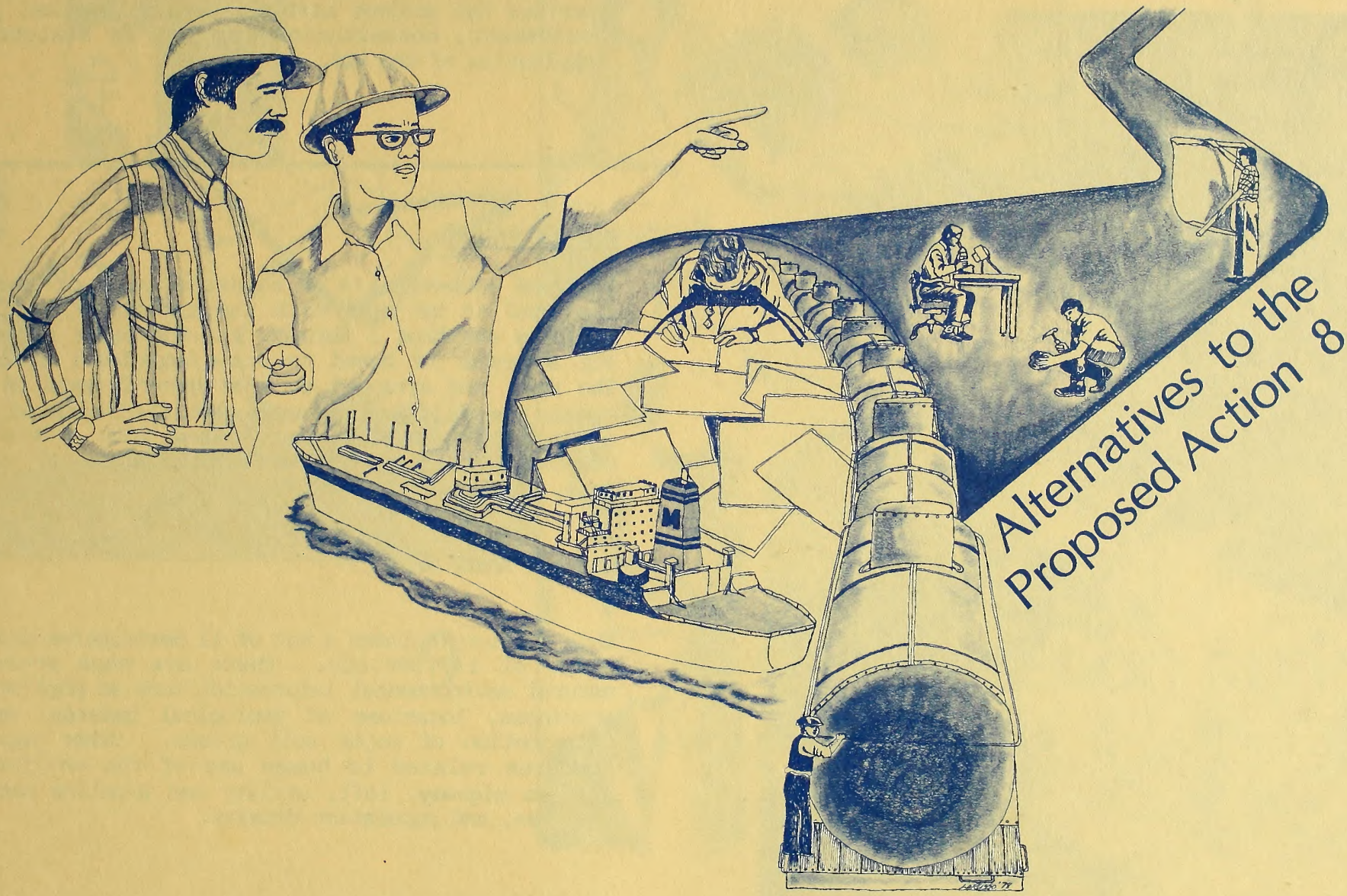

Alternatives to the Proposed Action 8

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Chapter 9--Consultation and Coordination

Chapter 9 describes the consultation and coordination which took place during the preparation of the DES with federal, state, local, and private agencies, organizations and individuals. The chapter briefly describes the project history, data collection, public involvement, consultation required by statute, and distribution of the DES.

Map Addendum

The Map Addendum is a separate part of the DES, designed to be used with the narrative part which includes chapters 1 through 9. The order of maps in the addendum is based on scale and level of detail. The maps are arranged so that general maps of large areas are followed by more detailed maps of local areas. The maps are organized into 4 sections: General Route Maps, Marine Resource Maps, Port Angeles Maps, and Alignment Sheets.

General Route Maps

This section includes a set of 11 descriptive maps at a scale of 1:7,500,000. There are maps presenting natural environmental information such as physiographic provinces, locations of geological hazards, and the distribution of major soil groups. Other maps show features related to human use of the environment, such as highway, rail, utility and pipeline networks, land use, and population density.

9 Consultation and Coordination

Marine Resource Maps

These maps cover an area including the Pacific Coast of Washington north of Grays Harbor, the Strait of Juan de Fuca, Puget Sound, and the southern portion of the Strait of Georgia. The maps provide a variety of information about the locations of marine resources, recreational activity sites and facilities, fishing areas and scientific study areas.

Port Angeles Maps

These maps include detailed sheets with information about the natural environment and existing land uses. In addition, there are several maps showing existing and projected dispersion of various air quality pollutants.

Alignment Sheets

The alignment sheets are the principal reference maps for chapters 2 and 3 of the DES. The entire area which would be affected by construction of the proposed project, from Port Angeles to Clearbrook, is shown on a series of 26 sheets at a scale of 1:250,000. The first 3 sheets deal with potential marine resource impacts only. They cover the port and onshore storage facility areas and the pipeline corridor around Puget Sound. Next there is a complete set of 26 sheets focusing on the natural environment. Each sheet has two map strips, one with descriptive information, the other showing the location of potential impacts related to climate, air quality, noise, topography and geology, soils, aquatic resources, marine resources, terrestrial vegetation, and terrestrial wildlife. Finally, there is a second set of 26 sheets with information about the human environment. Again, each sheet has two map strips, one with descriptive information about land use and the other showing the locations of potential impacts related to cultural resources, visual resources, land use, transportation and utility networks, recreation, and social and economic conditions.

REFERENCE

Oceanographic Institute of Washington
1978. Oil-spill Risk Analysis for the Federal Northern Tier Pipeline Environmental Statement. Seattle, Washington.

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NORTHERN TIER PIPELINE CO.

CITIZEN INFORMATION

☆U.S. GOVERNMENT PRINTING OFFICE: 1978—696-845